VOL. XIII. No. 6 JUNE 1930

MECCANO MAGAZINE



THE ROMANCE OF THE PINEAPPLE

(See page 434)

6D.

Hobbies

SAILING BOATS



ALL BRITISH MADE

Summer is here—the yachting lake calls. Great sport with racing boats scudding before the breeze the length of the pond. See the sails belly out under the sudden gust, and the boat rip forward, or a model launch steadily chugging along under its own steam. A handsome and thoroughly modern boat for any mechanically minded boy. And the prices are within reach of anyone's pocket. At camp or on holiday, or even at home, a Hobbies boat gives you endless enjoyment.

STEAM LAUNCHES

SAILING BOATS

You can't get every boat to sail; you can't even get every boat to float. But Hobbies "Ace" series are guaranteed to do both. Built by practical people, they are rigged on the Bermuda principle—a type now exceedingly popular amongst real yachtsmen. Beautifully balanced and finished. They range from 2/6 to 6/6. Or there is "Whitewings" or "Seagull" at 8/6 and 15/-.

STEAM LAUNCHES

Every lad knows Hobbies Steam Launches. You can see them on every pond, chugging away steadily for 20 minutes at one filling of the boiler. Lamp, filler and full instructions supplied with each. A special safety valve renders the boiler quite safe. Models from 30 ins. long cost 17/6 to 42/-.

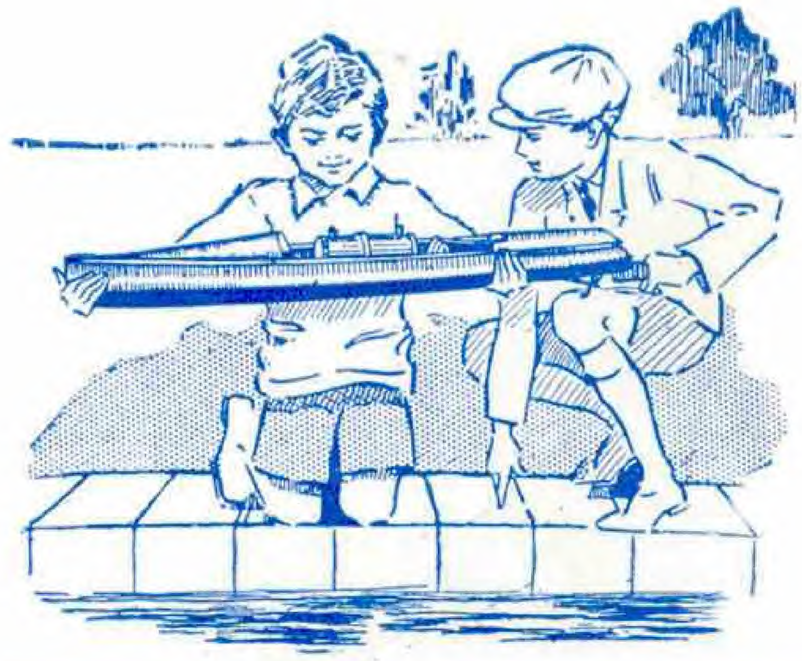


THIS WALLET FREE

A COMPLETE RANGE OF THESE BOATS ILLUSTRATED AND WITH FULL DETAILS SENT FREE IN STRONG WALLET COVER ON APPLICATION TO DEPT. 96, HOBBIES LTD., DEREHAM, NORFOLK.

FROM ALL LEADING TOY SHOPS, STORES, ETC.

BE SURE TO ASK FOR HOBBIES



See them at any Hobbies Branch in London, Glasgow, Manchester, Birmingham, Sheffield, Leeds, Southampton, Brighton. Or send your order direct to Hobbies Ltd., Dereham, Norfolk. Canadian Depot: 844 Yonge Street, Toronto.

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With the Editor

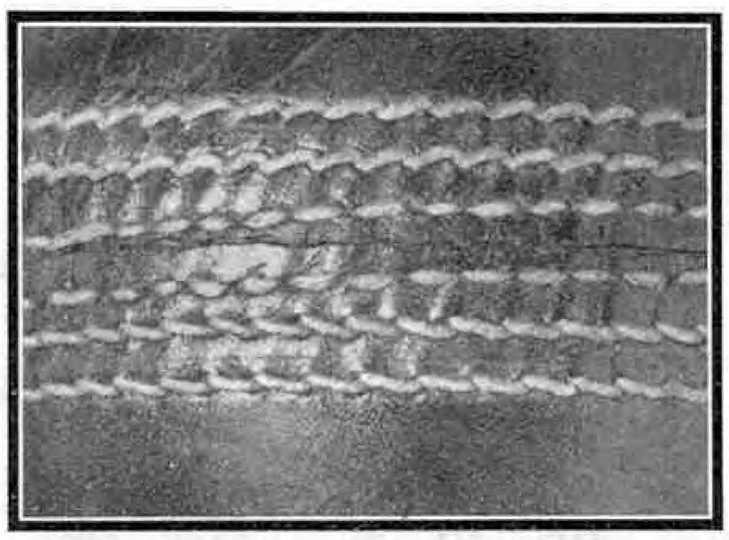
The Coming Railway Centenary

To most boys, Liverpool already is famous as the city from which Meccano and Hornby Trains come, and many readers every year take advantage of the opportunity of visiting the factory at which these products are made. In September next the city will become an even greater centre of attraction, for from the 13th to the 20th of that month will be celebrated the hundredth anniversary of the opening of the Liverpool and Manchester Railway. The coming centenary is of importance for two reasons—because it marks the hundredth birthday of the first passenger steam railway of more than local importance, and because it was on this line that the "*Rocket*" proved that the steam locomotive was bound up with the future of the railway.

Preparations to celebrate the event in a fitting manner are being made. In addition to pageants and other civic festivities, a temporary track is being constructed in a large park, which incidentally is not far from the Meccano factory. On this track will run old-fashioned trains in charge of drivers, firemen, and guards attired in costumes of a century ago. Visitors will have the opportunity of travelling in these trains, which will be drawn by replicas of locomotives that in 1830 and the years following were objects of admiration and wonder. To ride behind locomotives of this kind will be a very interesting experience, although passengers will find the carriages very uncomfortable in comparison with those now in use!

It is more than three months to the date of the centenary but it is not too soon for those who wish to be present to make the necessary plans. I have already received many letters from readers who intend to come to Liverpool for the celebrations, and it is evident that a very large number of Meccano boys and members of the Hornby Railway Company will take advantage of this wonderful opportunity. Those who come to Liverpool for the event should not omit to add to the interest of their visit by calling at "Meccanoland," where they can be sure of receiving a warm welcome.

No. 19. WHAT EVER IS IT?



Here is the nineteenth puzzle in the popular series of mystery photographs. Can you identify this mysterious looking object?

To the first reader to send an exact answer or, if nobody is successful in this, to the one who gets nearest I will send an autographed copy of my book "Wonders of Engineering."

Solutions should be written on postcards only and addressed "Editorial Competition, No. 19, 'Meccano Magazine,' Old Swan, Liverpool." Closing date, 30th June.

"To Make Sensible"

The interesting announcement has been made that the two greatest German ship-owning firms have decided to abandon rivalry and in future to work in unison. These are the Hamburg-Amerika Line and the North German Lloyd. Both have built large vessels for the transatlantic service and both have been fierce competitors of British shipping firms. The North German Lloyd owns the "*Europa*" and the "*Bremen*," the vessels that have deprived the "*Mauretania*" of what is usually called the Blue Riband of the Atlantic.

The recovery made by the shipping industry of Germany since the end of the War has been remarkable. Ten years ago she had practically no mercantile fleet, but thanks largely to the fostering care of the German Government a great expansion has taken place. The replacement of competition between German shipbuilding firms by co-operation also has had a great share in the revival. This is generally referred to by the formidable-sounding term "rationalisation." The meaning of this word is simply "making sensible," and as the word is often heard when the alleged decay of British industries are being discussed, it is worth while considering exactly what it means.

To take shipbuilding as an example, it is said that to-day there are too many shipbuilding yards, and that the total capacity of these yards is greater than the demand at present existing for new vessels. This results in waste, for in certain instances firms are not building a sufficient number of ships to enable them to pay the upkeep expenses of their yards. In many quarters it is argued that such yards should be closed down and that the work should be concentrated in the remainder, which then could be worked to their full capacity. It is believed that if this were done the shipbuilding industry eventually would be placed on a firm basis. Putting an end to competition by cutting out smaller and less efficient organisations in this manner—rationalisation—may be applied to any industry. The scheme is said to have proved a success generally in Germany, and probably this has led to the adoption of a similar plan by the two great German Shipping Companies.

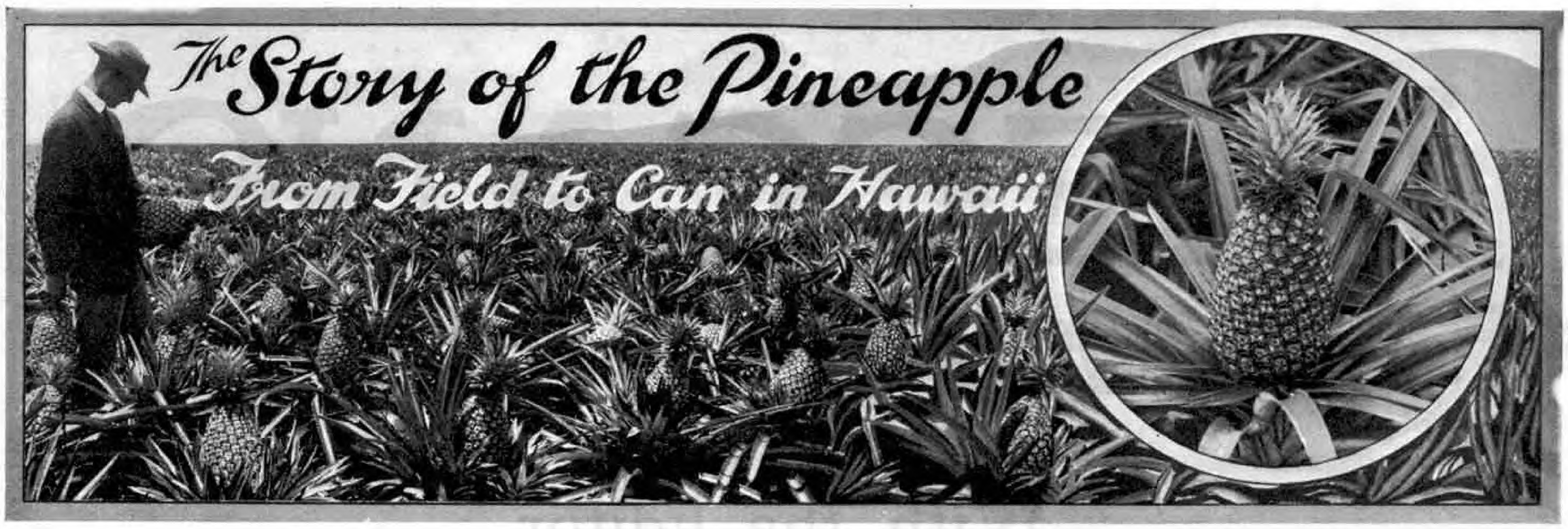
Certain industries in Great Britain possibly would benefit greatly from rationalisation. Of course, a reasonable plan for applying it to shipbuilding or any other British industry cannot be devised without deep thought. One of the difficulties that would have to be met is that the closing down of any works, large or small, necessarily means that workmen lose their employment. Eventually these men may find other employment of the same kind, but in any case hardships appear to be practically inevitable, and if possible some means of avoiding them must be found.

Knotty problems of all kinds have confronted British industries on previous occasions, however, and these have been solved. We may rest assured that the problems of rationalisation will be carefully considered, and hope that in the end British industries will regain the magnificent position they have held for many years.

May Mystery Photograph

If scarcity of correct entries is the criterion, this photograph was one of the biggest successes of the mystery photo series. Apparently readers of the "*M.M.*" do not wear their tennis shoes until sole and body are about to part company, for less than 50 of them were familiar with the subject of our photograph! (In order to avoid misapprehension let me hasten to say that the shoe is not my property, but that of the Meccano Cricket Club's groundsman!)

The winning entry came from T. Binnington, 90, Carr Lane, Grimsby, to whom an autographed copy of the Editor's book, "*Engineering for Boys*," has been sent. In addition, 25 consolation prizes have been awarded for the next best entries.

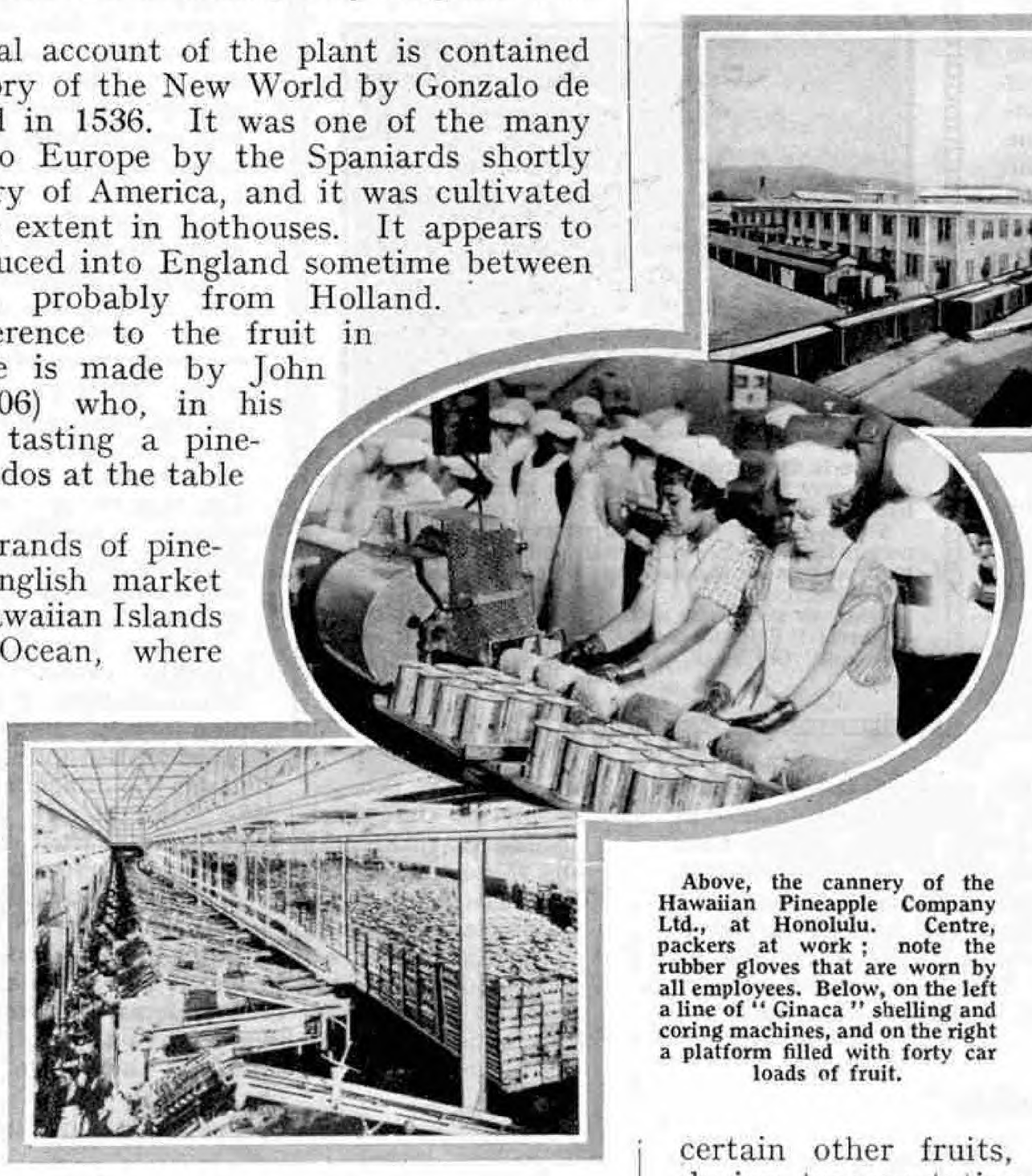


THE pineapple is one of the most familiar and popular of the many fruits that come to us in canned form. In a comparatively short period the cultivation and canning of this fruit has grown into a vast industry, giving employment in various ways to thousands of people. The plant (Ananassa sativa) is of tropical American origin, and was found in the course of the later voyages of Columbus—" a fruit resembling green pine-cones with flesh like a Melon, very fragrant and sweet."

The first general account of the plant is contained in a natural history of the New World by Gonzalo de Oviedo, published in 1536. It was one of the many plants brought to Europe by the Spaniards shortly after the discovery of America, and it was cultivated to a considerable extent in hothouses. It appears to have been introduced into England sometime between 1670 and 1690, probably from Holland. The earliest reference to the fruit in English literature is made by John Evelyn (1620-1706) who, in his diary, mentions tasting a pine-apple from Barbados at the table of Charles II.

The choicest brands of pine-apple on the English market come from the Hawaiian Islands in the Pacific Ocean, where several varieties are cultivated. Thousands of acres are devoted to the plant in South Florida, and it is grown on a large scale in the West Indies. The West Indian pineapple has established itself in many parts of Brazil, notably in the Pernambuco district, where it has the curious feature of retaining when ripe its early grey-green colour, instead of changing to the familiar and typical red. Other important areas of cultivation are the Straits Settlements, Queensland, South Africa, Siam, the Azores and the Canary Islands. There are two methods of cultivation, in the open field, and under lath sheds that protect the plant from light frosts and from the heavy tropical rains.

The finest pineapples grown in the open come from the Hawaiian Islands, where the industry has developed very rapidly and is now carried on on an enormous scale, notably by the Hawaiian Pineapple Company Ltd. The history of this company is interesting. It was founded in 1901 by James D. Dole, a native of Boston, U.S.A. When Dole staked out his homestead in Wahiawa, 23 miles from Honolulu, his idea was to take up coffee growing. His attention was attracted by the plant-ripened pineapple, of which a few were grown in the islands, and he became convinced that there were great possibilities in this fruit. It was not long before he abandoned all thoughts of coffee growing and devoted himself entirely to the pineapple.



Above, the cannery of the Hawaiian Pineapple Company Ltd., at Honolulu. Centre, packers at work; note the rubber gloves that are worn by all employees. Below, on the left a line of " Ginaca " shelling and coring machines, and on the right a platform filled with forty car loads of fruit.

There were many difficulties to be faced and problems to be solved, but Dole tackled them all fearlessly, being confident of ultimate success. He knew that in 1900 canners had done a small amount of business in pineapples picked green in the West Indies and sent to Baltimore and canned there. The great trouble experienced by these men was due to the fact that the pineapple, unlike certain other fruits, does not mature satisfactorily during transportation. A pineapple picked green is sour and tough, and when ripened artificially it is still sour and tough; therefore it must be plant-ripened and put into cans immediately.

Dole's main difficulty was that there was no cannery available and that he had no money to build one. He endeavoured to interest the business men of the islands in his project with the object of raising the necessary capital, but they had little faith in the scheme and

only a small amount of money was forthcoming. Nothing daunted, Dole sailed for San Francisco, and there and in his home town, he succeeded in raising sufficient additional money to make a start. In due course he formed his company, and they produced their first "pack" in 1903. This amounted to 1,893 cases; to-day the company pack that quantity in half-an-hour, and grow 90 per cent. of the pineapples they pack.

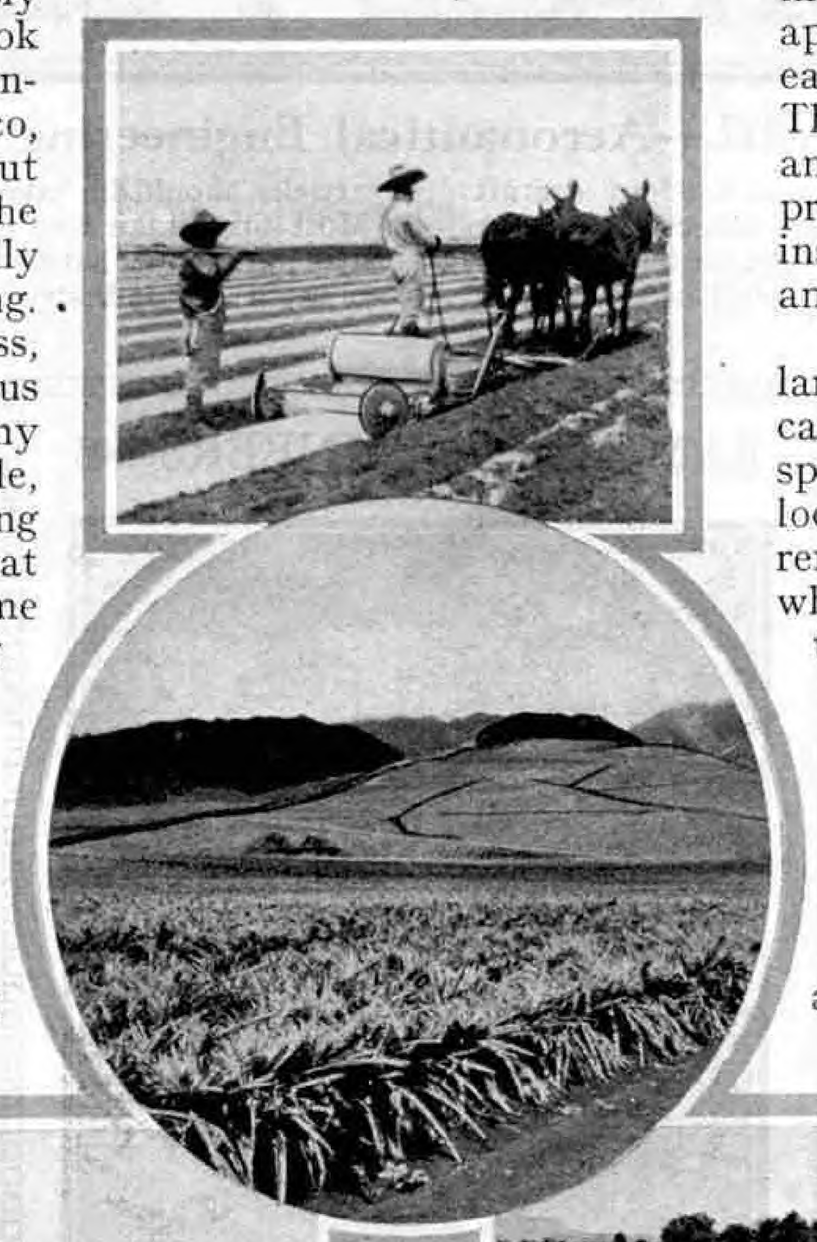
It is estimated that in the entire group of Hawaiian Islands there are about 89,000 acres suitable for pineapple cultivation, of which 44,300 acres are top grade, 36,600 middle grade, and 8,100 poor grade. In 1900 very little of this acreage was in cultivation; to-day there is no desirable land left. In 1922 the Hawaiian Pineapple Company, having securely established themselves, began to look round for room to expand. They considered areas in the Philippines, Mexico, Fiji, Malaya and other regions, but finally came back to Lanai, one of the Hawaiian Islands, which was generally regarded as fit only for cattle raising. The island certainly looked hopeless, much of it being covered with cactus of an enormous size. The company were satisfied that the soil was suitable, however, and they set about preparing it for planting. At first the cactus beat them completely, but they overcame it in the end by the method of hitching a chain round clumps of the plant and dragging it away by tractors.

Then the engineers took the island in hand. First they built a harbour by cutting away the cliffs on one side, running out a heavy breakwater and dredging. Next they constructed a road capable of carrying the heaviest traffic, running seven miles back into the island and rising to a height of 1,600 ft. Finally they built a miniature town for the workers and brought water across the mountain range on the windward side of the island to a reservoir, close to the town. The island is now completely organised and is in radio-telephonic communication with the cannery, 60 miles away.

Patience plays a very important part in the growing of the Hawaiian pineapple. First of all the old plants are burned off the land and their remains are ploughed in. A heavy crop of Para grass is then planted, and when it is full grown, to a height of about 3 ft., this also is ploughed in. Then come four more ploughings, followed by fertilising just before planting. The land is idle, or rather resting, for two years, and then after it is planted there is a wait of from 18 to 22 months for the first crop. Only the best material goes into the fields. More than 30,000,000 plants are set out every year, and each one is separately examined, hand trimmed and treated before it is hand planted. Every few weeks all the year round the whole of the plants, to the number of more than 100,000,000, are sprayed with iron sulphate, which has a marked effect in improving the fruit. This spraying is done by a special machine that sprays from eight to twelve rows of plants at a time.

When the pineapple has grown to its luscious maturity it is picked and dealt with with the greatest possible speed, for delay at this stage is apt to result in loss of some of the elusive flavour that makes the fruit so attractive. Most of the harvesting is done during July and August, although a second crop is gathered in December and January. The pineapples are not picked haphazard, but each one is first carefully inspected. The pickers tap the fruit with a finger and listen for the sound that indicates prime ripeness and brimming juice inside. When they obtain this sound, and not before, they pick the fruit.

The picked fruit is taken first to a large outdoor receiving platform at the cannery, from which it goes to inspection tables. Here all inferior-looking fruit is stopped, and the remainder passes to the Ginaca machine, which shells and cores pineapples at the rate of from 40 to 100 per minute, and at the same time cuts off both ends and shaves the whole of the fruit out of the shell. From this machine the fruit passes to the trimming table, where girls complete the trimming process and also inspect the fruit a second time, rejecting any of inferior or doubtful quality. A moving belt then carries the fruit to a slicing machine and then to the packing table, where it is sorted into cans according to quality and colour. The inspection at the packing tables is very close and is carried out by highly-trained workers, who examine every slice.







Above, laying mulch paper over the ploughed and fertilised land; the plants are inserted through the paper. Centre, miles of pineapples, showing the intensive nature of the farming. Below, left, spraying the plants with iron sulphate; right, planting through the mulch paper, which protects the plants and prevents weeds.

The time occupied in the whole process from fruit to can is $91\frac{1}{5}$ seconds. Then follow a special vacuum treatment that intensifies the flavour by letting syrup into the air cells of the sliced fruit; syruping, exhausting and sealing—time 8 minutes $32\frac{2}{5}$ seconds. Finally come cooking, lacquering the can, drying the lacquer and cooling the can—time 17 minutes 55 seconds. The total time taken by the various processes from the fresh fruit to the finished product is a second or so under 28 minutes.

It is always pleasant to know when we are eating food of any kind that it has had clean handling. The sliced pineapple, once the shell is off, (*Continued on page 462*)



VIII.—Aeronautical Engineering

IN view of the wonderful speed and efficiency of modern aircraft it seems almost incredible that only 17 years ago the Schneider Trophy was won by a machine that travelled through the air at a speed of only 45.75 m.p.h. The average speed of the winner of the last contest was no less than 328.63 m.p.h., and it is interesting to find that its stalling speed was about twice as high as the maximum speed of the monoplane in which the first race for the trophy was won.

The amazing efficiency of modern aircraft is a tribute to the high standard that aeronautical engineering has reached, in spite of the short time that has elapsed since it became a separate branch of the industry. Twenty years ago little was known of the stresses and strains set up in the structures that were flown, and some of those that were taken into the air proved unable to stand up to the work they were called upon to do. In certain instances crude early machines literally fell to pieces while in the air and it is safe to say that none of the aeroplanes of that time could have withstood the strain of being flown at speeds approaching those that now are regarded as quite normal.

The demand for steady and efficient aircraft that followed the outbreak of the Great War quickened the progress of the new industry. As the result of extensive research work, both theoretical and practical, the design of machines was greatly improved and to-day it is very seldom that an aeroplane accident may be ascribed to structural failure of any part of a machine.

As the youngest branch of engineering, aeronautical engineering has not yet attracted sufficient attention to become overcrowded, and it is generally agreed that there are more opportunities in this industry than in any other branch of engineering. The opinion of those in responsible positions seems to be that in the near future the aircraft industry will provide good openings, for it is growing rapidly year by year and offers scope for men with good training who are capable of working out and adapting new ideas.

This does not mean that merely to gain entry into the industry is a guarantee of success. Aircraft design is becoming more and more scientific, and the necessity for the efficient technical education of those engaged in it yearly becomes greater. The best prospects are only open to those who are willing to give the necessary time and energy to making themselves worthy of them, but an intelligent and industrious boy who has a leaning towards aeronautical engineering need not hesitate to take up a career in this industry.

In order to commence a career in aeronautical engineering articles should be taken out with a firm of aircraft manufacturers. Most firms take two grades of apprentices—trade and technical. The difference between these is similar to that ruling in other branches of industry. The former merely learn fitting or some other branch of aircraft construction, but the latter are given facilities for passing through all departments of the works in which they are employed, and their training is concluded with a period spent in the design office.

Trade apprentices usually have received their education at an Elementary School. They commence work at about 16 years of age and are indentured for a period of about five years. Boys already engaged in minor posts who have displayed marked keenness and aptitude also are sometimes rewarded by apprenticeship. There is no fixed rule that one trade should be specialised in, the practice in this respect varying considerably, nor are premiums usually demanded, although small fees must be paid in the case of certain firms. Naturally the training is comparatively limited in scope, however, and usually qualifies boys for positions as skilled workmen.

Technical apprentices are recruited from the ranks of those who have attended Universities, Technical Colleges or Secondary and Public Schools. The higher education they have received enables them to appreciate the ideas behind the design and construction of aeroplanes, and it is to them that we must look for ideas that will lead to important developments. The conditions under which they serve vary, but the general plan is that they should pass through all departments of the factories in order to make themselves familiar with the work carried on in them, and that a considerable proportion of their apprenticeship should be spent in the drawing and design office. In all cases their education must be continued during the term of apprenticeship, the instruction they receive being of course specially adapted to their needs.

Undoubtedly the best method of qualifying for a responsible and well-paid post in the aircraft industry is to obtain a University degree in engineering, for this is a guarantee that the principles underlying the construction of aircraft have been thoroughly grasped. Training of this character must go hand in hand with works experience, and many firms prefer that at least one year's practical experience in an aeronautical engineering works should precede the University course. On the completion of this the period of apprenticeship may be served. In addition the excellent plan is followed by some firms of arranging a " sandwich " course similar to that followed in other branches of engineering. In

FAMOUS ENGINEERS—8



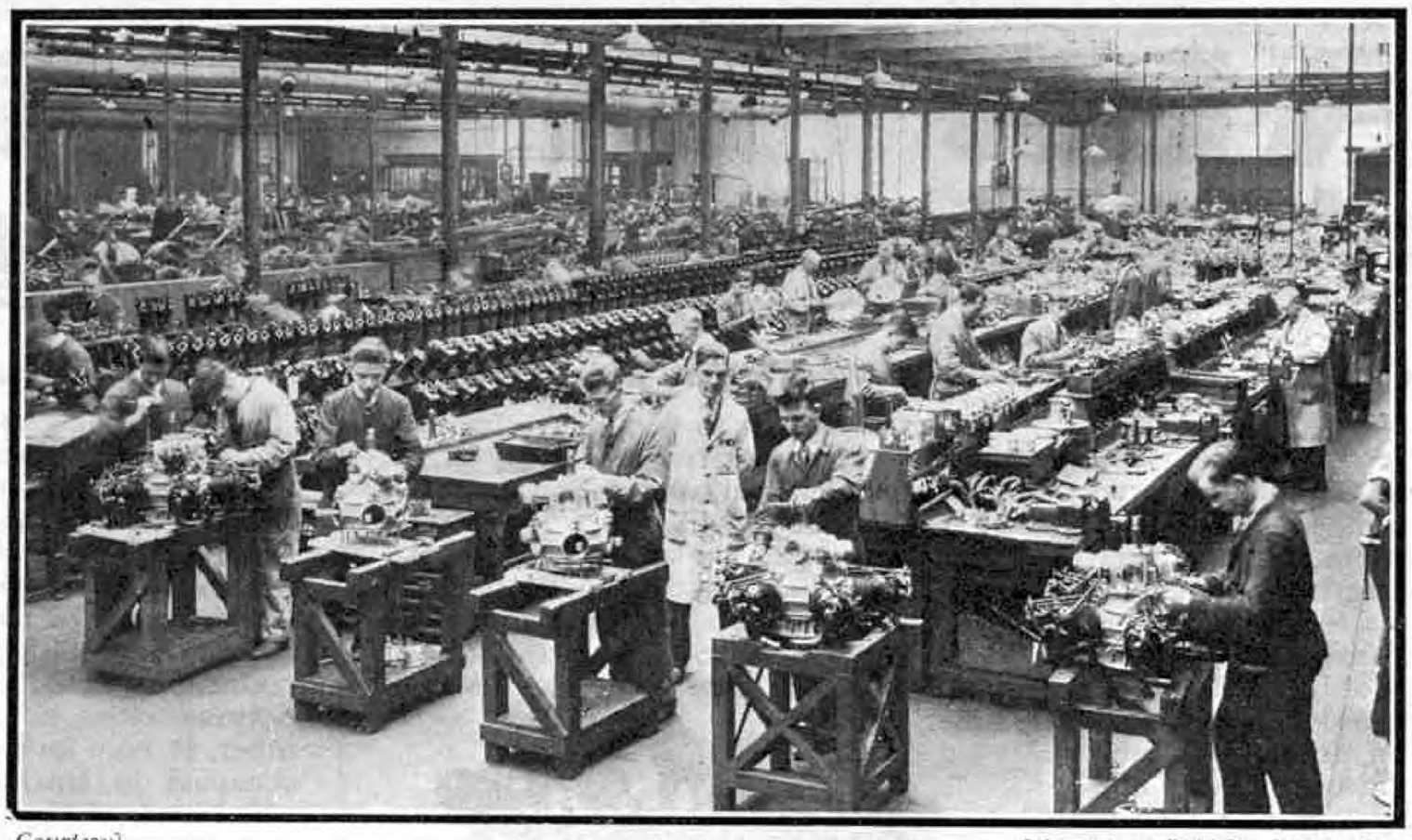
Sir Alliot Verdon Roe, a pioneer British aviator who began his career in 1906 by winning a prize for a model aeroplane. Turning his attention to real aeroplane construction, he carried out important experimental work at Brooklands and other places, building several interesting experimental machines.

Later Sir Alliot founded the firm of A. V. Roe & Co. Ltd., and designed the " Avro " 504K, an aeroplane that achieved world-wide fame as a training machine. This was followed by other interesting and efficient machines, and recently Sir Alliot has become specially interested in the production of seaplanes and flying boats.

this, terms of service in the shops alternate with courses at the University.

Technical apprentices who are unable to take a University course, attend Evening Classes at Technical Colleges and Schools. They are not barred from taking an engineering degree, for they may qualify for that given by the London University. Naturally this cannot be secured in the time occupied in obtaining the degree of a University that offers facilities for internal students only, for studies must be carried out in conjunction with daily work instead of as a whole-time occupation. A degree is valuable however, and an ambitious apprentice will be well advised to aim at obtaining one, or at least to qualify for the Diploma in Engineering awarded as the result of examinations conducted jointly by the Engineering Institutions and the Board of Education.

The terms under which apprenticeship may be taken up vary to some extent. In many cases a premium varying from £50 to £500 has to be paid, but there are instances in which technical apprentices make no payment of this kind.



Courtesy] [*Armstrong Siddeley Motors Ltd.*

An interesting view in the works of a famous firm of aero engine constructors.

Practically all firms are keenly desirous of obtaining men with initiative, and they encourage apprentices in their employ to take full advantage of their opportunities and to follow the additional courses of instruction on the theoretical and mathematical side of engineering that will assist them in obtaining advancement. It is not usual for apprentices of any kind to be guaranteed appointments at the end of their term of service, but permanent positions usually are offered to apprentices with marked ability. Encouragement also is given to apprentices to win promotion to a higher grade without payment of additional premium, but naturally this is only possible for those who show special aptitude for the work and exceptional progress in their studies, in addition to good time-keeping.

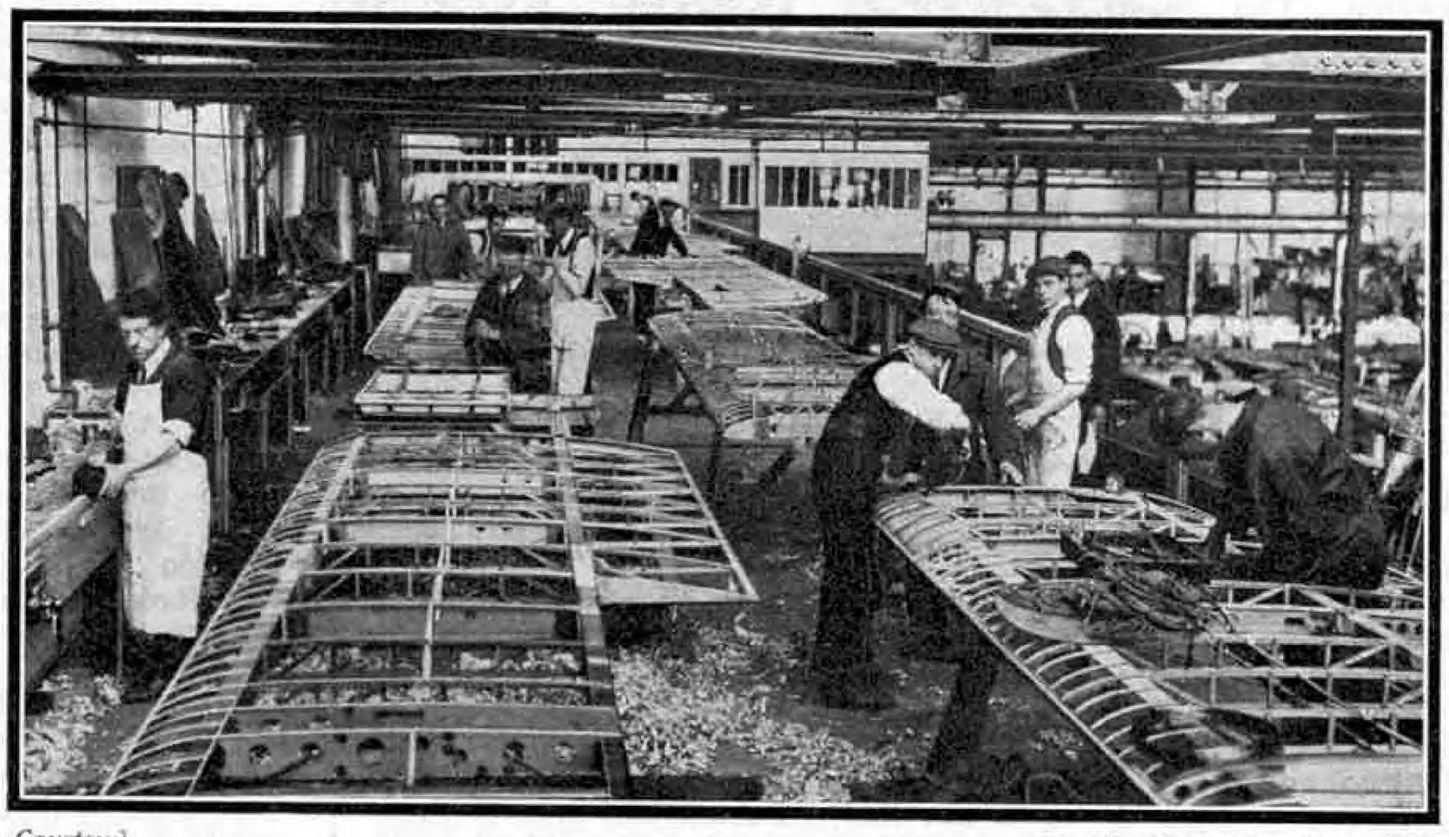
During apprenticeship small wages are paid, these being similar in amount to those received by apprentices in other branches of engineering. At the commencement of the term from 7/6 to 10/- per week is paid, and this rises to about 30/- per week in the last year of apprenticeship.

The boy who believes that he is specially fitted for work in the aircraft industry and wishes to enter the works of a manufacturing firm should make application to the one that appears most suitable. An excellent plan is to make enquiries regarding the conditions under which various firms take apprentices, and to compare these very carefully before making definite application. It is very important to bear in mind that when an apprenticeship has been entered upon it must be completed, and care therefore must be exercised in making a start. The Editor of the "*M.M.*" is always willing to place his knowledge of the industry at the disposal of readers. Naturally in an article of this kind the subject can only be treated from a general point of view, and any boy who is thinking of entering upon a career in it should write to him if he is in need of any special information.

For a boy who has no dislike for military training there are excellent prospects in the Royal Air Force. In it a splendid all-round experience of the maintenance of aircraft and aero engines may be obtained, and the work is a qualification for good posts in aircraft factories. In exceptional cases it may even lead to higher appointments, but of course, this only is the case with really good men who make a special study of aeronautical engineering.

The usual method of entry into this service is by means of an apprenticeship that is taken up between the ages of 15 and 17 years. Certificates of good character given by two responsible people are required from each applicant.

If his application is favourably received, the aspirant sits for the entrance examination of the Royal Air Force School of Technical Training at Halton. This consists of three papers, mathematics, science and a general paper, including composition. It may be taken either in open competition, the examination being held twice a year at various centres by the Civil Service Commission, or in a limited competition conducted by the Air Ministry in co-operation with Local Education Authorities. Boys who take the second of these examinations must be nominated by the Local Education Authority, or some other approved body, and they compete only with other nominated candidates. The examination is held all over the country at centres arranged by the nominating bodies. No entrance fee is charged and a boy who wishes to secure a nomination should consult his Headmaster.



Courtesy] [*De Havilland Aircraft Co. Ltd.*

The wing constructing department at Stag Lane Aerodrome, showing parts of the "Moth," the well-known light aeroplane, being made.

So far as Service requirements allow, those who succeed in the examinations and become Royal Air Force apprentices are allowed to select the trade in which they shall be trained, the boys who secure highest marks obtaining the first choice. According to his inclination the apprentice then becomes a carpenter (rigger), a coppersmith and metal worker, an electrician, a fitter in one of three recognized classes, a metal rigger, or a wireless-operator-mechanic. Pay varying from 1/- to 1/6 per day is given during the training period and when posted to a unit for duties as an aircraftman this rises to 3/3 to 5/6 per day (22/9 to 38/6 per week), according to the number of marks obtained in the passing out examination.

Opportunities may be given of becoming airmen pilots and special prizes in the shape of free cadetships at the Royal Air Force Cadet College, Cranwell, are awarded at the end of the apprenticeship course to a few of the outstanding boys.

Full particulars regarding the Air Force may be obtained from the Secretary, Air Ministry, Adastral House, Kingsway, London, W.C.2, and in addition, the Editor of the "*M.M.*" will be pleased to give advice to any reader who writes to explain his circumstances.



AIR NEWS

The " Jaguar Major "

The " Jaguar Major " is the name applied to the most recent engine produced in the Armstrong Siddeley factory at Coventry. As its name suggests, the new engine is a development from the " Jaguar " that was described in detail on page 460 of our issue for June, 1929.

Although its overall diameter is approximately the same as that of its predecessor the output of the new engine is considerably greater. This increase of power has been attained by enlarging the bore from 5 in. to 5.25 in., thus giving a greater cubic capacity to the cylinders.

The general design of the " Jaguar Major " closely follows approved Siddeley standard practice. The engine has 14 cylinders and a compression ratio of five to one. It is made with a reduction gear similar to that used on the " Jaguar " and may be obtained with a geared fan or with a supercharger. When equipped with the former its performance is more than ten per cent. better than that of the standard " Jaguar," the improvement being due to the slight supercharging effect of the fan. The engine in this form is declared at 525 h.p. at a height of 3,000 ft. When run at full throttle on the ground it develops 600 h.p. at 2,200 r.p.m., but this, of course, is only possible for short periods. The supercharged engine is declared at 500 h.p. at 11,500 ft.

The weight per rated horse power of the geared fan type is 1.75 lb., while that of the supercharged model is 1.98 lb. The total weight of the former is 985 lb., and the supercharged engine weighs 996 lb. The normal fuel consumption is approximately 40 gallons per hour for the geared fan type, and 30 gallons per hour for the supercharged type engine. The geared fan engine uses about 12 pints of oil per hour, and the supercharged, 9 pints per hour.

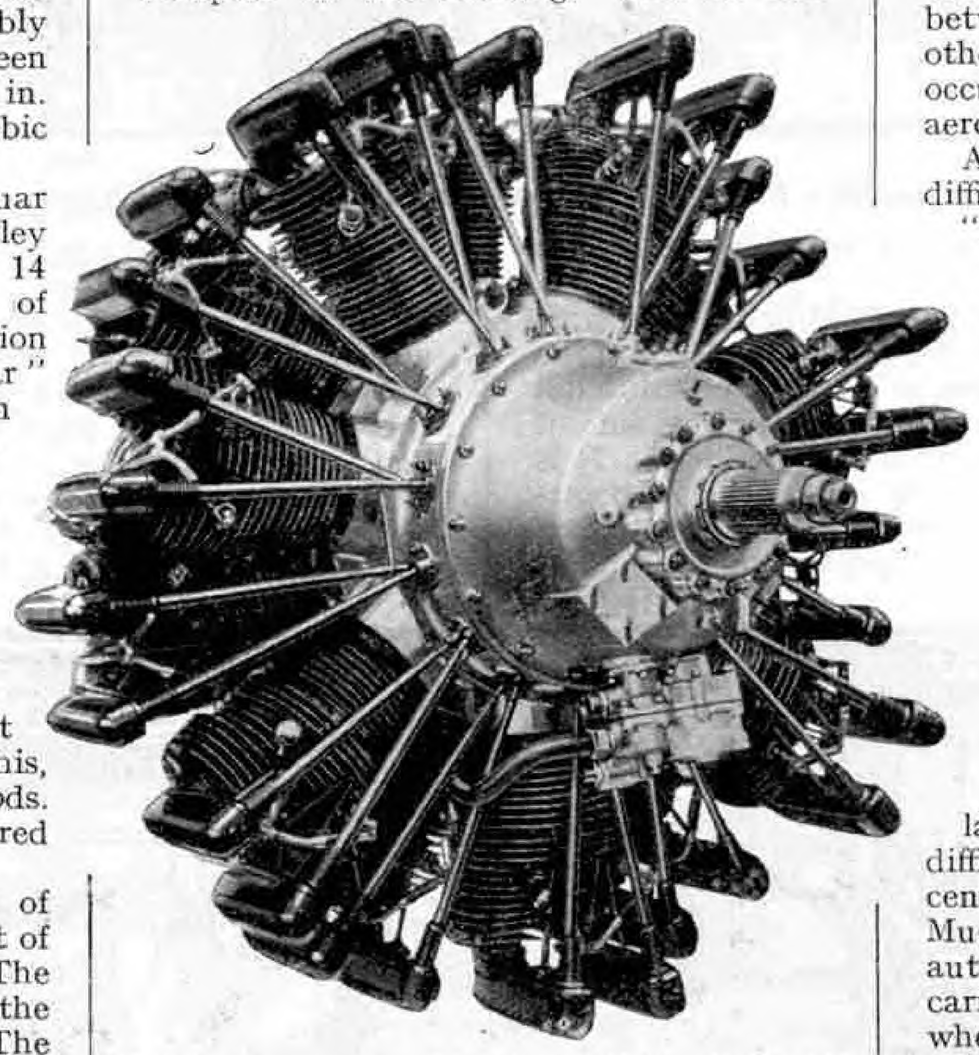
Privately-Owned Aircraft

At the end of last year there were 214 private aircraft in Great Britain, and these were in the possession of 196 owners. The number does not include aircraft owned by light aeroplane clubs. The corresponding figure for the United States was 540. This is slightly more than twice the number of private aircraft in Great Britain, but in proportion to population the latter country is better provided with privately-owned machines than any other in the world.

The country with the third greatest number of privately-owned aircraft is Germany, in which 100 machines were registered at the close of 1929. France and Italy with 70 and 25 aeroplanes respectively come next.

The World's First Aerial Ferry

What is claimed to be the shortest and busiest aeroplane route in the world is that recently inaugurated between San Francisco and Oakland, in California. The service is best described as an " aerial ferry," for the two cities are on opposite sides of San Francisco Bay, across which the flights are made. Six minutes only is occupied in the crossing. This is considerably less than the 40 minutes required when the journey between the cities is made by train and boat.



Courtesy [*Armstrong Siddeley Motors Ltd.*

A three-quarter front view of the Armstrong Siddeley " Jaguar Major."

The single fare is about 6/–, and the service immediately became popular with business men and others who regularly cross the Bay. During the first 19 days that it was in operation, a total of 8,330 passengers were carried ! This is believed to be a world's record.

The service is operated by Keystone-Loening amphibian machines, each of which cost £6,000. These aircraft carry nine people, including two pilots, and are equipped with 525 h.p. Pratt and Whitney " Hornet " engines. They take off from water at a speed of about 85 m.p.h. and from land at 55 m.p.h. The total weight is 5,900 lb., and the machines possess a wing span of 46 ft. 8 in. and are 34 ft. 8 in. in total length. The cruising radius is 550 miles.

Aerodrome over the Thames

It is becoming increasingly evident that if aviation is to become a popular method of transport between cities in the British Isles, arrangements must be made for speedier communication between the centres of the large cities and the associated aerodromes. In most cases these are at a considerable distance beyond the city boundaries, and when flights are made between cities not far distant from each other, it may be found that more time is occupied in travelling to and from the aerodromes than in actual flight.

A proposal that would overcome this difficulty was referred to on page 925 of the "*M.M.*" for December, 1929. This was that the roofs of railway stations should be made flat and suitably strengthened in order that they could be utilised as elevated aerodromes. Although excellent in many respects, this plan appears to be too costly to be put into operation. It has been estimated that the cost of converting Waterloo Station into an aerodrome of this type would be about £5,000,000 !

It has now been suggested that autogiros should be used for transporting passengers from the centres of cities to aerodromes. Machines of this type would require only small landing grounds, and the cost and difficulty of providing these in congested centres therefore would be diminished. Much time also would be saved, for in the autogiros intending travellers could be carried swiftly to the existing aerodromes, where they would be transferred to ordinary air liners.

An aerodrome of this nature could easily be constructed in the heart of London by building a platform across the River Thames. The originators of the scheme claim that the cost of such a structure would be comparatively small, for it would not be necessary to build one strong enough to withstand the stresses to which an ordinary bridge is subjected. It is probable that the initial cost eventually would be recovered from the proceeds of the customary landing fees.

Total Cost of "*R101*"

In view of the many conflicting statements that have been made regarding the cost of "*R101,*" it is interesting to find that up to 31st March, 1930, the total expenditure on this vessel was only £603,500. This sum includes the cost of power plant, experimental engines, overhead charges, shed and flight trials, running repairs, modifications and maintenance, in addition to the initial cost of design and construction.

The Blackburn "Lincock"

On page 721 of the "*M.M.*" for September, 1928, brief details were given of the Blackburn "Lincock," a new single-seater fighter biplane. The machine was available in either all-metal or composite construction and was remarkable for its "clean" appearance and excellent performance. This aeroplane has now been completely redesigned. With the exception of fabric covering, the new "Lincock" is constructed entirely of metal, and is a small comparatively low powered single-seater aircraft possessing exceptional manœuvring powers.

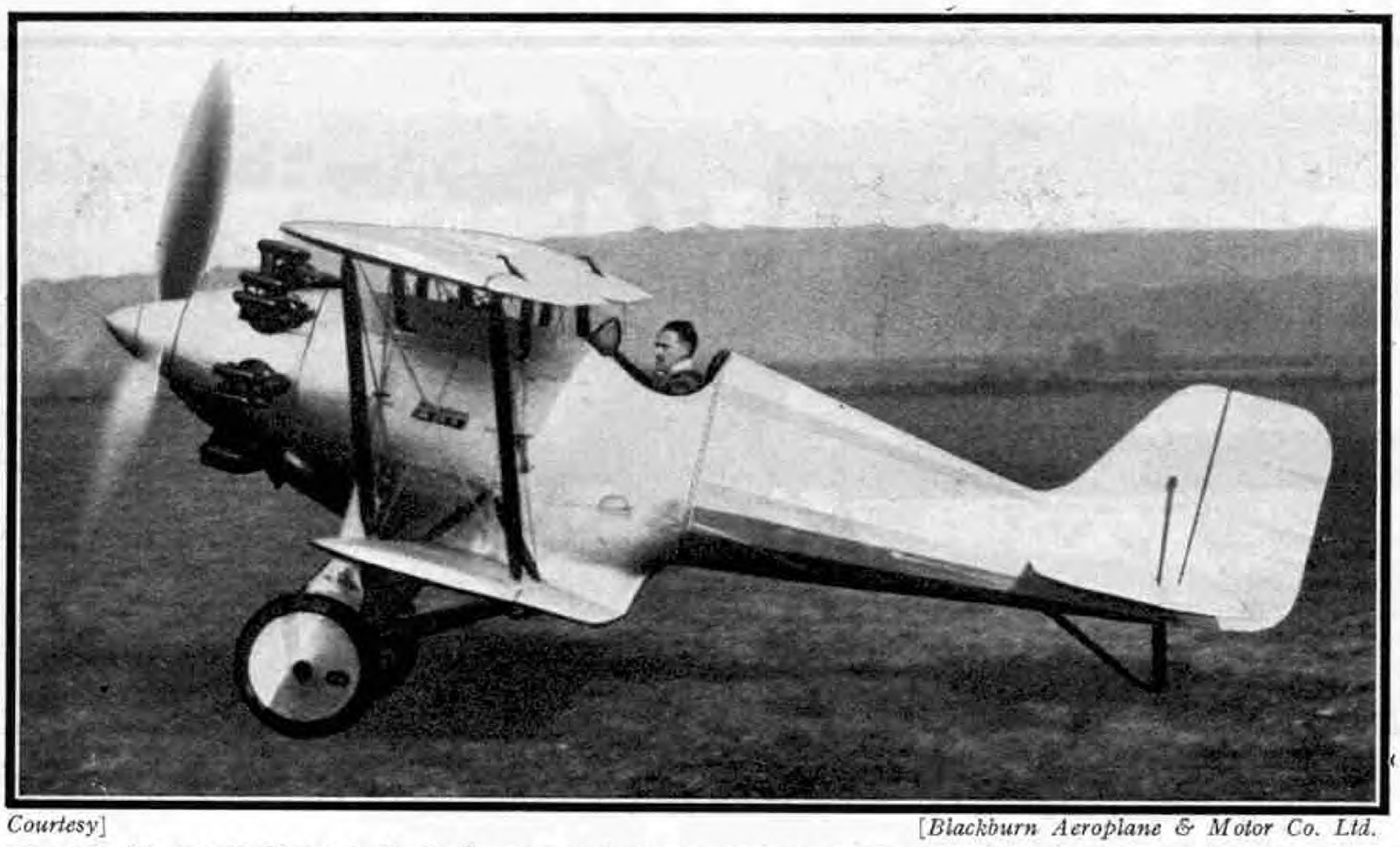
In order to adapt it to different purposes, no fewer than four engines are available as alternative power units for the new "Lincock." These are the "Lynx IV," the geared "Lynx," the "Lynx Major," and the supercharged "Lynx," all well-known Armstrong Siddeley products of proved efficiency.

When fitted with any one of the four engines, the normal gross weight of the machine is 2,000 lb., and the wing loading is 11.3 lb. per sq. ft. Naturally the speed depends upon the engine employed. With the "Lynx IV" engine the top speed at ground level is 150 m.p.h. At an altitude of 10,000 ft. this speed is reduced to 142.5 m.p.h., and to 136 m.p.h. at 15,000 ft. For machines fitted with the "Lynx Major" these speeds are increased to 164 m.p.h., 159 m.p.h., and 153 m.p.h. respectively.

The landing speed of the machine is 60 m.p.h. Its rate of climb from ground level varies from 1,400 ft. per minute with the "Lynx IV" to 1,660 ft. per minute with the "Lynx Major." When the latter engine is fitted, the machine climbs from an altitude of 10,000 ft. at 1,000 ft. per minute, and from one of 15,000 ft. at 640 ft. per minute.

For a machine in which the "Lynx IV" is installed the service ceiling is 18,400 ft., and this becomes 23,000 ft. when the "Lynx Major" is employed, and as high as 28,200 ft. when the supercharged "Lynx" is fitted. With the last named engine which, of course, is of a type specially fitted for high altitude flying, the speed at a height of 15,000 ft. is 170 m.p.h.

During a recent demonstration in Canada, the members of the Royal Canadian Air Force were astonished by the performance of Blackburn "Lincock" fitted with a 215 h.p. "Lynx" engine. A report on the demonstration states that the "Lincock" gave "one of the most thrilling exhibitions of aerial aerobatics and mock combat ever viewed by local flying men," and the machine was described as "the tiniest and most manœuvrable of modern fighting craft ever flown in Canada." The "Lincock," which is one of the standard single-seater fighters used in the R.A.F., probably also will be issued to fighter squadrons of the R.C.A.F.



Courtesy] [*Blackburn Aeroplane & Motor Co. Ltd.*

The Blackburn "Lincock" single-seater fighter taxying on the ground. This machine has been redesigned. It possesses exceptional manœuvring powers and is a remarkable advance in design and construction.

New Liners for India Air Mail Service

Two new air liners have been placed in service on the England-India air mail service. The first is an all-metal flying boat of the "Calcutta" type, built by Messrs. Short Bros., of Rochester. Aircraft of this class are used on the trans-mediterranean section of the route between Athens and Alexandria. The second machine is a triple-engined de Havilland "Hercules" air liner. A fleet of aeroplanes of this type already were in operation on the sector between Cairo and Delhi, and the new machine now is regularly employed on this part of the air mail route.

The journey from Cairo to Delhi is made via Palestine, Iraq, and the coast of Persia, and involves the crossing of two deserts, one in Arabia and a second between Karachi and Jodhpur in Sind. The de Havilland machines flown over this portion of the route have been specially designed to operate in the climates peculiar to these regions.

Air Port at Cherbourg

It has been decided to construct a new air port at Cherbourg. Many transatlantic and other liners now call at the port, and it is expected that passengers embarking or disembarking there will make use of the air lines that are to be established.

The new air port is to be constructed on the site of the race course and it is expected that work on it will be completed within a very short time.

American Diesel Engine for Aircraft

The first details of the Diesel aero engine developed by the Packard Automobile Co., Detroit, U.S.A., have now been made available for publication. The engine was designed by Capt. L. M. Woolson, the well-known American internal-combustion engine engineer. It was completed about a year ago and in the interval has successfully emerged from a series of tests. In these it ran for the same time that it would have done if fitted in aeroplanes making flights over a total distance of 250,000 miles. It also was used for actual flights in two machines, one of which was a cabin aeroplane to carry six people.

The Packard Diesel engine is of the nine-cylinder radial air-cooled type, and in external appearance does not differ greatly from a petrol engine of similar output. It weighs 510 lbs., and at 1,900 r.p.m. develops 225 h.p. Thus the engine has a weight to power ratio of 2.26 lb. per rated horse power. In this respect it is greatly superior to the ordinary Diesel engine, which weighs about 25 lb. per horse power. It was in making the weight reductions necessary that the chief difficulties were encountered in adapting this type of engine to aircraft.

A noticeable feature of the Packard Diesel aero engine is that each of the nine cylinders has only one valve, this serving both as inlet and outlet. An arrangement of this kind is possible because pure air only is drawn into the cylinder at each inlet stroke, the engine being of the solid fuel injection type. As the air enters it is given a violent spiral motion. This causes the fuel to be atomised quickly and it is mixed with the air so thoroughly that a speed of more than 2,000 r.p.m. is attained. This is nearly 1,000 r.p.m. more than has been reached in previous high speed Diesel engines.

Immediately after the compression stroke the temperature inside each cylinder is about 1,000°F., which is well above the ignition point of the fuel used. In order to give easy starting, glow plugs are fitted, thus ensuring ignition and an instantaneous start at any temperature at which the crankshaft can be rotated. It is interesting to note that the cylinders of the new engine are fastened to the crank-case with hoops instead of bolts.

The new engine incorporates many features of great novelty and interest. Diesel engines undoubtedly will become increasingly important, because of the diminished risk of fire that will accompany their use in aircraft, and we hope shortly to publish photographs and further details of the Packard engine of this type.

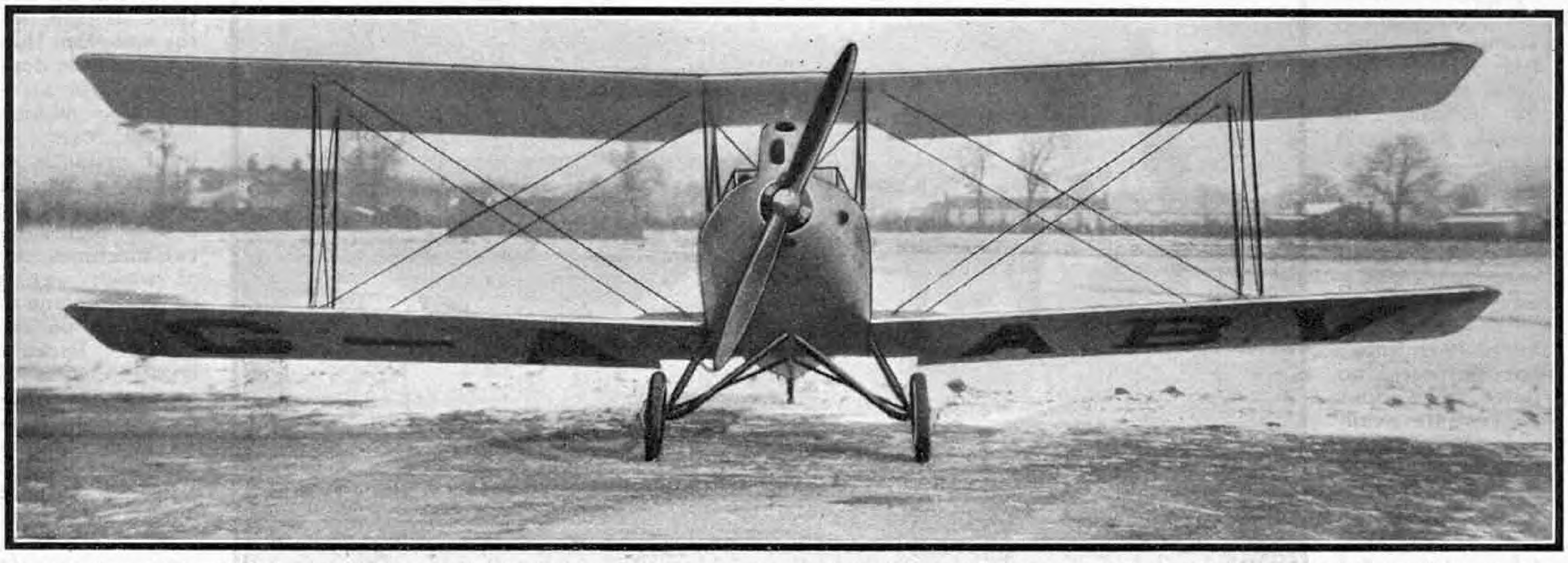
THIS MONTH'S AIR STORY

Pilot (to girl passenger after her first flight): "And did you enjoy the trip?"

Passenger: "Yes, thanks! But I was a little disappointed at not hearing the piston ring!"

The Blackburn "Bluebird IV"

Two-seater All-metal Light Aeroplane and Seaplane



Front view of the Blackburn "Bluebird IV" light two-seater aeroplane. For this and the other photographs illustrating this article we are indebted to the Blackburn Aeroplane and Motor Co. Ltd.

WHEN aircraft manufacturers turned their attention to the production of light aeroplanes, one machine of this type that attracted much attention was the Blackburn "Bluebird." This was remarkable because the cockpit was planned to allow pilot and passenger to be seated side by side, and it was the first successful light aeroplane in which such accommodation was offered. The arrangement caused the machine to be a little slower than if the occupants had been seated in tandem, but the aeroplane had an excellent performance, and became very popular.

The "Bluebird" has been entirely redesigned and from an aeroplane of wood construction has become one of the all-metal type. This simplifies maintenance and repairs, and also ensures reliability in different weather and climatic conditions. The reconstruction of the machine also has given it a greatly improved performance. At the same time it has retained all the merits of the original model, and is a remarkably easy aeroplane to pilot.

The "sociable" method of accommodation employed makes the machine eminently suitable for training purposes, for the pupil actually sees how his instructor manipulates the controls and when he himself is piloting the machine, his movements may be closely watched, and mistakes corrected without loss of time.

The wings of the Blackburn "Bluebird IV," as the new machine is called, are of the normal single-bay biplane construction. The two planes are of equal span and chord. They are built up from steel spars of special section and duralumin ribs, any one of which may readily be replaced without disturbing the main structure. The top plane is staggered slightly forward, but no sweep-back is employed, except when the Armstrong Siddeley "Genet" engine is fitted, provision being made in the design of the planes to allow for this.

The wings of the machine are designed to be folded quickly and easily, and in their construction an improved design of folding joint is used that eliminates the necessity for jury struts. Ailerons of the Frise type are fitted to the bottom planes only. If required, Handley Page automatic slots may be fitted to the top planes as an extra. The gap struts are of steel tube and external bracings are by streamlined wires.

The central section of the upper plane consists of a gravity petrol tank, the cross-section of which is similar to an aerofoil section. The front spar of the wing passes through the tank and forms part of it, but when the wings are folded it is readily removable for repair or replacement. In this section of the upper plane the trailing edge is cut away as far as the rear spar in order to allow the pilot to obtain a good view rearward and upward. The tank is braced by means of rearward struts fixed at their lower ends to the fuselage. No side bracing wires are used and thus ready access to the cockpit is given.

The fuselage is built up in distinct units that readily may be disconnected for repair or replacement. The central portion consists of duralumin frames and four main steel tubular members braced by tie rods. In front of it is the engine unit, and the foremost transverse member forms a fireproof bulkhead between it and the cockpit. Two other duralumin frames form the attachments for the chassis, bottom planes and top centre plane struts.

Behind the central unit is attached a normal four-longeron fuselage structure that is detachable at four points. Just in front of the tail plane is another detachable joint, at which the stern portion of the fuselage complete with the tail unit can be disconnected. The complete fuselage structure is built of steel tubes braced by steel tie rods, the same size of tube being used throughout.

The tail plane is adjustable in the air and, being attached above the fuselage, is fully accessible. Well-proportioned elevators are fitted, and the rudder is of generous proportions. The latter is of the balanced type, no fin being fitted, and the frame at the rear is strengthened and fitted with a hand-hole by means of which the tail can be conveniently lifted and the machine wheeled about as required.

A great advantage of the "Bluebird IV" is that the machine is designed to be used as an aeroplane or seaplane, and the two chassis are readily interchangeable. The land chassis is of the divided type and has a wide track, giving exceptional stability in taxying over rough ground. An interesting feature is that there is no through axle, the space between the wheels and below the fuselage being left comparatively clear, thus lessening the possibility of the machine turning over on landing in long grass or under other unfavourable conditions.

Each unit of the land chassis consists of a bent axle hinged from a central fuselage joint and braced by a rearward strut. Landing shocks are absorbed by a telescopic strut, in which is a steel spring working in conjunction with an oil dashpot. This type is more satisfactory than the usual rubber buffer-strut, for it gives the wheels greater freedom of movement, and is more resilient. In addition, the steel does not perish, as is the case with rubber, and renewals are practically unnecessary. The tail skid also is fitted with a metal spring in place of rubber, and is equipped with a robust metal shoe that is easily replaceable.

The float chassis is similar to that which has proved so efficient on previous "Bluebird" models. Two pontoon type floats of duralumin construction are employed. They are joined to the fuselage by a triangulated system of steel struts, and there are no horizontal cross members between the floats.

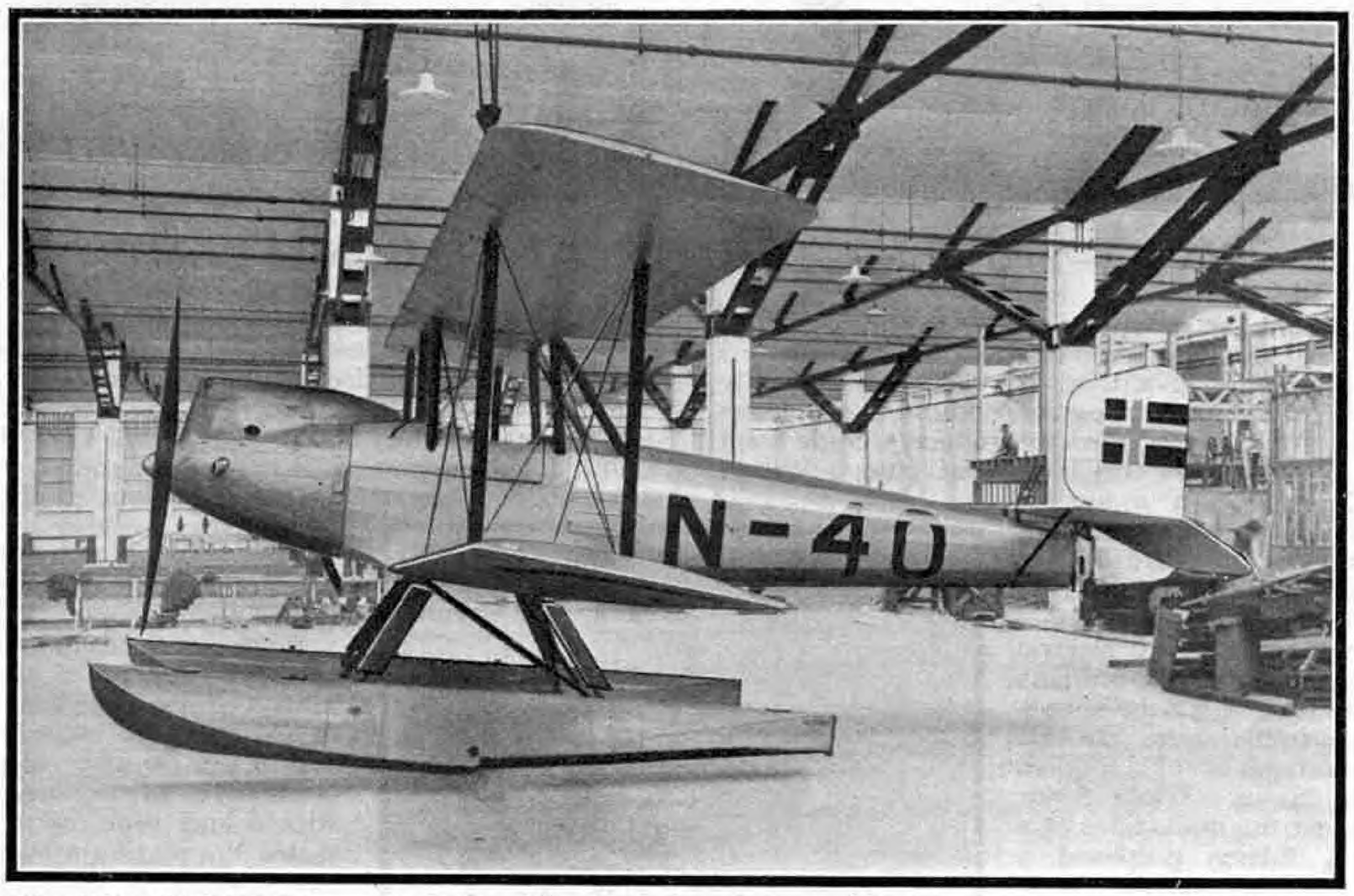
An important feature of both types of chassis is that no wire bracing is employed. No rigging check or adjustment is required, therefore, and upkeep of the machine is simplified.

The task of keeping the "Bluebird IV" in good condition also

is made easier by fitting controls that are operated throughout by pull and push rods. In this manner friction is reduced to a minimum and wear of cables round pulleys is avoided. Thus adjustment is seldom required.

Accommodation in the cockpit is ample and all controls are within easy reach of the two occupants for whom it is designed. The ailerons and elevators are moved by means of two side-by-side control levers in the cockpit. When a passenger is to be carried, one of these quickly may be removed. The rudder bars also are similarly detachable and their positions may be altered in order to suit pilots of different heights. A central control quadrant is mounted on the dashboard to enable the pilot to manipulate the engine throttle and altitude controls. Thus it is within easy reach of both seats. All controls are fully accessible for inspection and lubrication.

The "Bluebird" has a wing span of 30 ft. Its width when folded is only 9 ft. 10 in., and the overall length of the machine is 23.2 ft. Petrol is readily fed to the engine by gravity feed from the tank that constitutes the central section of the top plane. This has a capacity of 19 gallons, giving the machine a cruising range of four hours, but if additional supplies of petrol are required a second tank may be fitted inside the fuselage behind the dashboard.



The "Bluebird IV" as a seaplane. The float chassis is readily interchangeable with that fitted for use on land.

The weight and the performance of the machine in the air is dependent on the engine with which it is equipped. Any one of no fewer than three well-known power units may be installed, these being the de Havilland "Gipsy," the "Cirrus" Mark III, and the Armstrong Siddeley "Genet."

In machines equipped with the "Genet" engine, an oil tank of 2½ gallons capacity is secured to the engine mounting. The oil in this engine is circulated by a pump, but the fitting is not necessary when the power unit employed is the "Gipsy" or "Cirrus" engine.



A three-quarter rear view of the "Bluebird IV," showing its exceptionally clean lines.

The manner in which the engine is mounted also is different in the case of the "Genet." The "Gipsy" and "Cirrus" engines are placed on a structure formed of steel tubes, but for the "Genet" a built-up box of duralumin plate must be provided. In each case the mounting is detachable at four points and hand starting gear is fitted as standard.

The all-up weight of the land machine fitted with a "Gipsy" engine is 1,420 lb., and when a "Cirrus" is employed this is 1,446 lb. A reduction in weight accompanies the employment of the "Genet" engine, the total weight in this case being 1,382 lb. When fitted with a "Gipsy" engine the machine has a wing loading of 5.77 lb. per sq. ft., and the horse power loading at normal engine speed is 15.4 lb. per h.p. The maximum speed at ground level is 109 m.p.h., the normal cruising speed 84 m.p.h., and the landing speed 44 m.p.h. The rate of climb from ground level is 810 ft. per min., and the service ceiling 15,600 ft. For machines equipped with "Cirrus" or "Genet" engines slightly different performance figures are given.

One of the great advantages of the "Bluebird" is that the two occupants sit side by side, and between them there is no obstruction of any kind. The seating accommodation is, in fact, similar to that of a two-seater motor car. Side doors admit of easy access to the cockpit and the bottom wings are reinforced at the root for the purpose of giving support when stepping in.

The comfort of pilot and passenger are carefully provided for. Ordinarily the cockpit of the machine is open, but a detachable coupé top may be fitted as an extra. In bad weather this gives excellent protection and a further advantage that follows from its use is that the noise of the engine is less troublesome. The interior of the cockpit is heated by means of a muff that is fitted over the exhaust pipe.

The personal belongings of the occupants of the "Bluebird" may be carried in two pigeon holes, one on each side of the dashboard, and accommodation for two average-size suit cases is available in the luggage compartment situated behind the cockpit, with access through the side door. Provision is made for securely fastening luggage in place and also for carrying long articles such as golf bags, fishing rods, guns, etc., in this compartment. Thus the machine is suitable for touring purposes.

A remarkable demonstration of the reliability of the "Bluebird IV" machine was given early last year by Squadron-Leader L. H. Slatter, O.B.E., D.S.C., D.F.C., R.A.F., who was the senior officer of the R.A.F. High-Speed Flight that in 1927 won the Schneider Trophy for England. Sq.-Ldr. Slatter had four month's leave at his disposal and decided to pay a visit by air to South Africa. At that time the new "Bluebird" was still in course of construction. There was little or no prospect of carrying out complete experimental trials on the type before the proposed date of his departure, but he resolved to make the flight in the first to be constructed.

Sq.-Ldr. Slatter's confidence in the all-metal "Bluebird" was not misplaced. He reached Durban in slightly more than a month, and during the whole of the flight practically no trouble was experienced, the development of a leak in the petrol tank alone suggesting that he was flying an untried machine.



XVII.—THE ELECTRIC INCANDESCENT LAMP

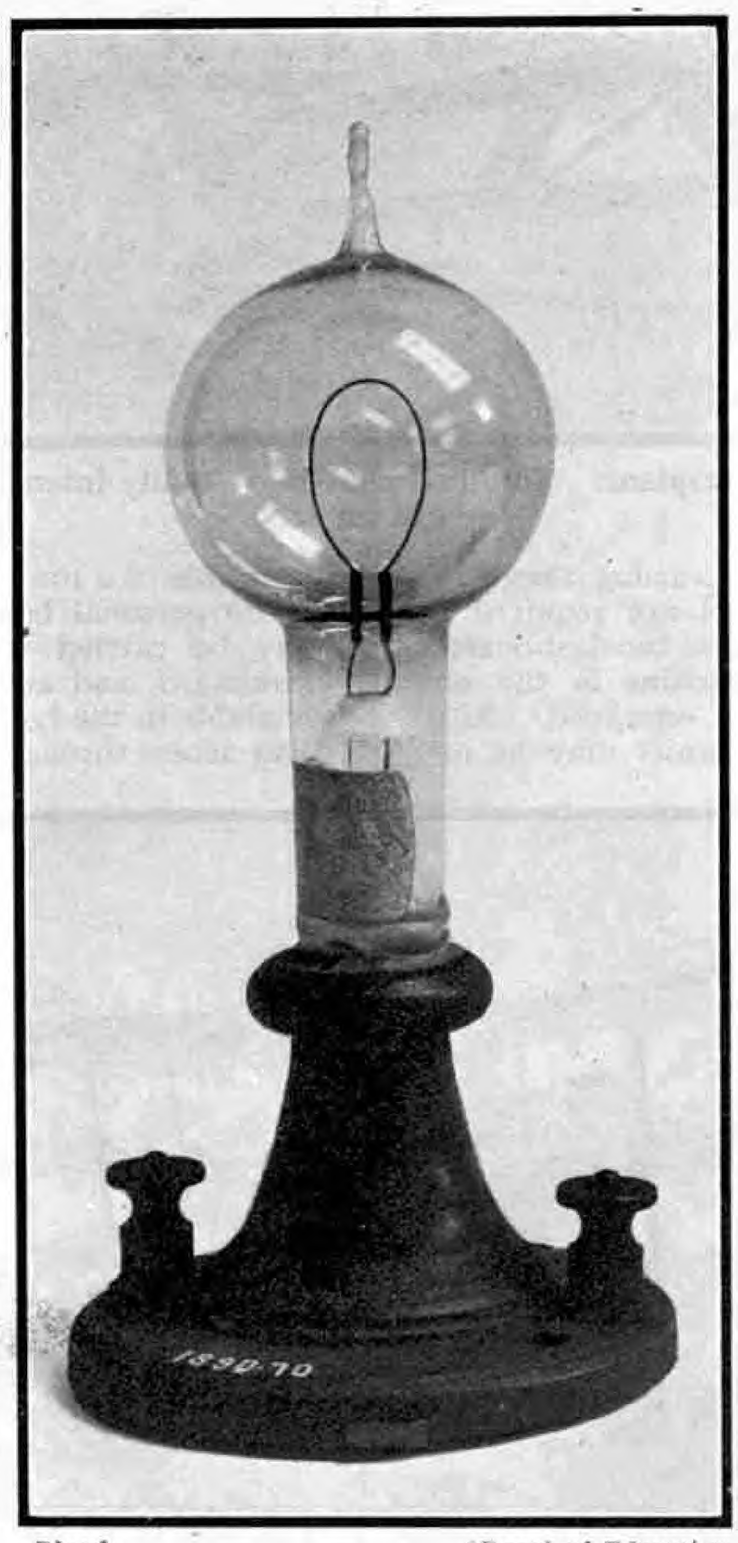
LAST month we saw that the success of the electric arc lamp for the illumination of busy thoroughfares and open spaces led to attempts by various inventors to produce an equally efficient lamp suitable for indoor lighting and domestic use. Thus an American named J. W. Starr was led to produce a crude form of incandescent lamp, and it was this lamp that Joseph Wilson Swan set out to improve. In a similar manner it was an arc lamp produced in 1878 by an American named C. F. Brush that drew the attention of Thomas Alva Edison to the problem of the small electric lamp.

Edison set himself to produce an electric incandescent lamp that would give a brilliant light and at the same time would be simple in operation and cheap to maintain. In this task he had many advantages over his English rival, Joseph Wilson Swan. While Swan worked alone and amidst the limitations of a small chemist's shop, Edison possessed a well-equipped laboratory at Menlo Park, New Jersey, and had a staff of more than 100, including many laboratory assistants of experience and the highest technical skill.

The first problem was the old one of discovering a suitable filament. Edison first experimented with lengths of platinum wire drawn out to the fineness of thread, but this wire quickly melted when current was passed through it. In a description of the problem he set out to solve Edison said, some years ago :—" I was fired with the idea of the incandescent lamp as opposed to the arc lamp, so I went to work and got some very fine platinum wire drawn. Experiment with this, however, resulted in failure, and then we tried mixing with the platinum about 10 per cent. of iridium, but we could not force that high enough without melting it. After that came a lot of experimenting—covering the wire with oxide of cerium and a number of other things.

" I then took a cylinder of zirconia and wound about 100 ft. of the fine platinum wire on it, coated with magnesia. What I was after was getting a high resistance lamp, and I made one that way that worked up to 40 ohms. But the oxide developed the phenomena now familiar to electricians, and the lamp short-circuited itself. After that we went fishing around and trying all sorts of shapes and things to make a filament that would stand. We tried silicon and boron, and a lot of things that I have forgottten now. I never thought in those days that a carbon filament would answer, because a fine hair of carbon was so sensitive to oxidation. Finally I thought I would try it because we had got very high vacua and good conditions for it.

" We sent out and bought some cotton thread, carbonised it, and made the first filament. . . We built the lamp and turned on the current. It lit up, and in the first few breathless minutes we measured its resistance quickly and found it was 275 ohms—all we wanted. Then we sat down and looked at that lamp ; we wanted to see how long it would burn. The problem was solved—if the filament would last. The day was October 21st, 1879. We sat and looked, and the lamp continued to burn, and the longer it burned the more fascinated we were. None of us could go to bed, and there was no sleep for any of us for 40 hours. We sat and just watched it with anxiety growing into elation. It lasted about 45 hours, and then I said : ' If it will burn that number of hours now, I know I can make it burn a hundred.' "



Photo] [Board of Education

One of Edison's early experimental lamps showing crude form of carbon filament and bulb.

It is important to notice that at this time Edison was working on lines identical with those of Swan, although the two men investigated the problem entirely independently of one another.

Edison, with his unfailing business instinct, was fully aware of the commercial possibilities of his invention, and he lost no time in patenting it both in the United States and in this country. His lamp, as patented, consisted of an almost globe-shaped glass bulb with a long neck, at the top of which were sealed the platinum leading-in wires. From these wires a conducting wire extended down the neck to the interior of the bulb, where it gave place to the carbon filament.

Although this lamp gave a fairly good light it was far from satisfactory in regard to the lasting quality of the filament, and Edison began an intensive search for a substance that would provide a filament of a stronger and more durable nature. This investigation was a remarkable one, and by the time it was completed Edison and his staff had carbonised and tested an extraordinary number and variety of materials. Tissue paper, cardboard and celluloid cut down to slender proportions ; thin strips of different kinds of wood ; coconut hairs, flax and various kinds of grasses—all these and many more substances were experimented with, but none of them gave a satisfactory result. Then one day Edison carbonised a piece of bamboo of the thinness of thread, detached from a strip torn from a Japanese fan. This filament was successfully mounted in a glass bulb, and when tested it not only gave a brilliant light, but proved to be the strongest vegetable fibre that had yet been tried.

This satisfactory result led Edison to commission experienced travellers to explore countries where bamboo was known to grow and to collect specimens of every possible kind. As a result of these expeditions he was able to test 80 different kinds of bamboo and 3,000 varieties of vegetable fibre ; but of this great number only three or four specimens proved suitable for conversion into carbon filaments. Subsequently Edison's energy and enterprise were rewarded by the production of a filament of carbonised bamboo that was satisfactory both as regards its light-giving power and its durability. Up to this time the bulbs of his lamps had been almost completely globular, but the bamboo filament lamp had a pear-shaped bulb blown from glass tubing 1 in. in diameter.

The electric incandescent lamp was now a practical and reliable source of light, and to demonstrate this a public exhibition was held at Edison's laboratory during the winter of 1880. The

laboratory and its immediate surroundings were brilliantly lighted, lamps were installed in several houses in the park, and the roads in the neighbourhood were illuminated by lamps mounted on poles. Altogether about 700 lamps were brought into use, current being fed to them by underground cables. Public interest in this exhibition proved so great that the Pennsylvania Railroad found it necessary to run special trains between Jersey City and Menlo Park to cope with the traffic.

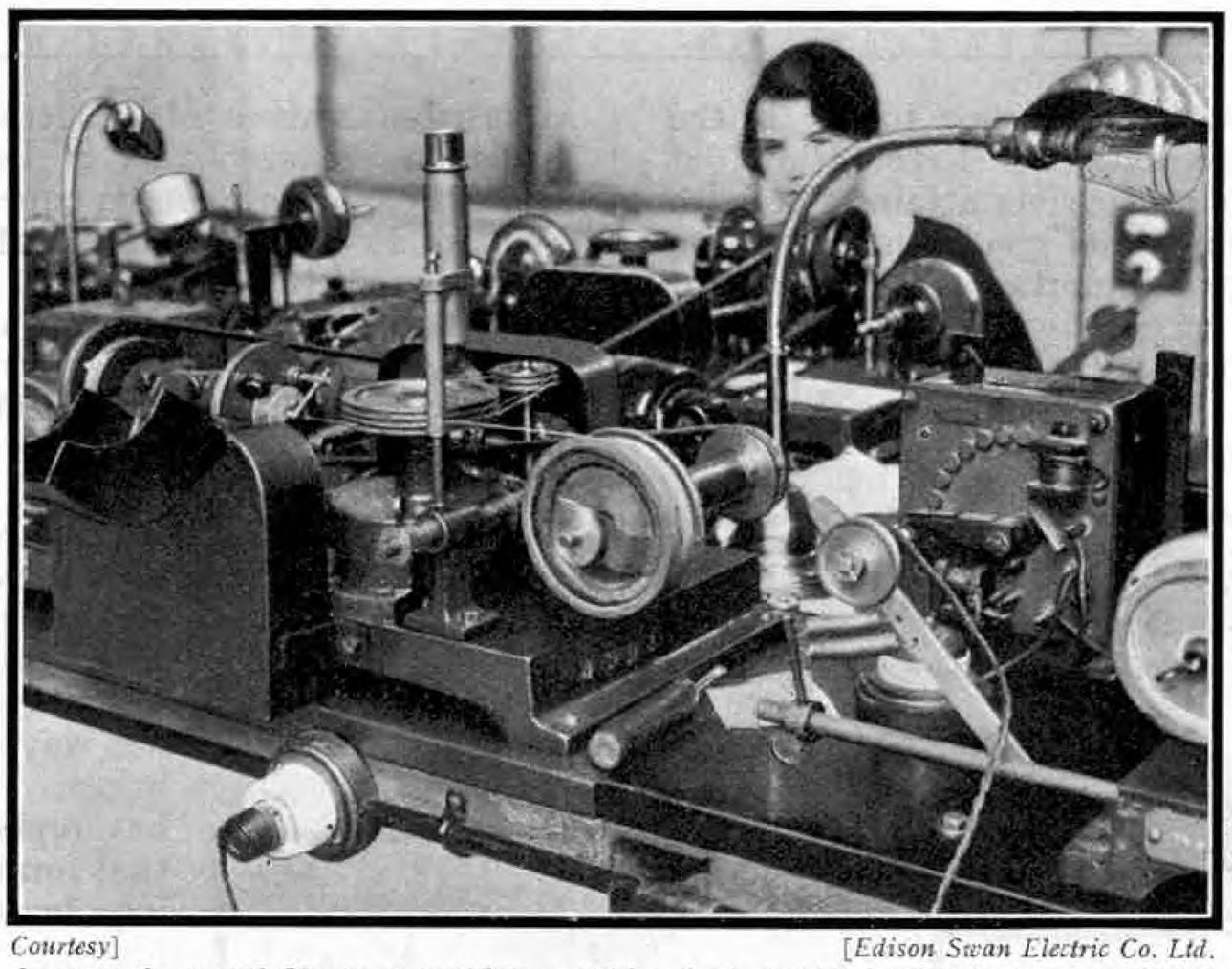
In 1881 Edison gave a display of his lamps at an electrical exhibition in Paris, and he received many honours and congratulations. Swan also was an exhibitor at the exhibition, and his display gained for him the decoration of the Legion of Honour. In the autumn of that year a factory for the manufacture of Swan electric lamps was started in Paris. About the same time the Edison interests made a similar move in England, and before the close of the year a lamp factory was opened near Holborn Viaduct, London. As a result of this enterprise the City Temple and a portion of the General Post Office were illuminated by Edison lamps. The rival companies continued to progress during the earlier part of the following year, the Swan interests securing the work of lighting the Mansion House, the British Museum, the Royal Academy and many other large buildings in London. In order to cope with the increasing business the Newcastle factory was reorganised and extended, and the enlarged company was named the "Swan United Electric Lighting Company Ltd."

Scarcely had the reorganised Swan Company settled down when the Edison Company commenced proceedings against them for infringement of Edison's lamp patent, and a long and bitter legal fight followed. Swan relied upon the lamp used by him at the lecture of the Literary and Physical Society at Newcastle on 3rd February, 1879, as proof that his lamp was invented before that of Edison. In a letter to his wife written in August, 1882, Swan refers to this evidence:—"As I may be called on at any moment to attend to this bothering legal business, I will snatch the present for a few lines to you. I need not say how glad I was to receive your telegram telling me that the lamp I used at the lecture is in safety and unbroken. I have made an affidavit denying the contention of the Edison Company, and it is expected that to-day the question will be decided whether they obtain an injunction to restrain our company from making lamps. I do not think there is the slightest doubt the application for an injunction will be refused, . . ."

As Swan predicted, the injunction sought by the Edison Company was refused. Overtures were then made for a peaceful settlement of the dispute, and eventually terms were arranged. The rival parties joined forces, and in 1883 a new company was formed in London under the title of the "Edison and Swan United Electric Light Company." This company adopted the parchmentised thread filament patented by Swan on 27th November, 1880, and the lamps produced were marketed under the name "Ediswan," compounded of the names of the two inventors.

In consequence of this amalgamation Swan removed from Newcastle to Bromley in Kent, where he was soon busy devising a non-fibrous thread to form the basis of an improved filament. In this he was successful, and in 1883 he patented a new method, in which nitro-cellulose dissolved in acetic acid was squirted under pressure through a fine die into a receptacle containing a coagulating fluid. The coagulated thread thus produced was subsequently shaped to the desired form and carbonised. The introduction of the squirting process was a big step forward, for it enabled filaments to be produced of much greater uniformity and fineness than had been possible previously.

The improved carbon filament lamp was so successful that more than twenty years elapsed before it was superseded, and during this period electric lighting increased steadily in popularity both in this country and abroad. In consequence the coal-gas industry suffered considerably and experienced many bad years before an invention, made in 1885, regained for it public favour. This invention, which was made by a Viennese chemist named Carl Welsbach, was that of an incandescent gas mantle that utilised metallic oxides to produce a brighter light with a smaller consumption of gas.



Courtesy [*Edison Swan Electric Co. Ltd.*

Automatic metal filament making machine in a modern electric lamp factory.

The principle of the Welsbach mantle attracted the attention of Dr. Walther Nernst, a German, who saw in it possibilities for the production of electric lamp filaments. After long research Nernst evolved an electric lamp in which the carbon filament was replaced by a metallic one, made from a composition of the oxides of zirconium and yttrium. As zirconium is a non-conductor when cold, the filament was provided with a heating agent in the form of an external coil of platinum wire. When current was switched on it heated this coil, which in turn heated the filament. As soon as the current began to flow through the filament an electro-magnetic cut-off automatically disconnected the heating coil. Nernst's lamp attained a considerable amount of popularity, but it had certain disadvantages, and ultimately its manufacture was discontinued about the year 1912.

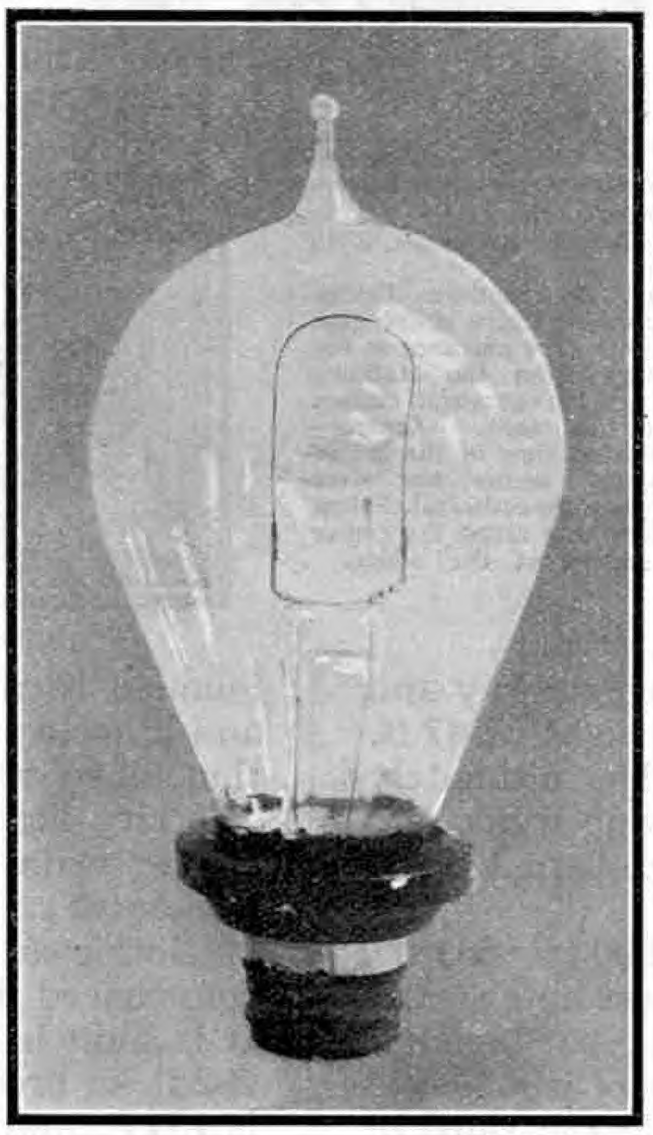


Photo [*Board of Education*

Early Edison lamp with bamboo filament and pear-shaped bulb.

As we have seen, Welsbach gave the gas industry a new lease of life by his invention of 1885. Twenty years later there occurred the curious spectacle of the same inventor helping along the electric light industry by producing a lamp with a metal filament. His filament was made of osmium, a rare and costly metal, principally found in association with platinum. As a source of light this lamp was efficient, but the difficulty of obtaining adequate supplies of osmium was so serious that in a few years the lamp ceased to be manufactured. The metal tantalum was next tried for the filament, and it proved so successful that it was evident that the day of the carbon filament was over. More recently the tantalum lamp has been superseded by lamps having a filament made of the metal tungsten, and these lamps are in general use to-day.

The metal filament lamp reduced the consumption of electric current by more than 50 per cent., and further improvements were made by replacing the vacuum in the lamp by a charge of an inert gas. Many different gases were tried, among which nitrogen proved very successful in reducing still further the consumption of current. The first gas-filled lamps were of high candle power suitable for the lighting of streets and public buildings, but subsequently low candle power lamps were produced, suitable for domestic purposes.

One of the most recent uses of electric lamps is for "flood-lighting" large buildings, memorials, etc. Only lamps of very high power are used for this purpose and these are enclosed in projectors having an interior reflector and front prismatic lens. In one well-known lamp the light is restricted to one plane and is projected in the form of a rectangular beam.

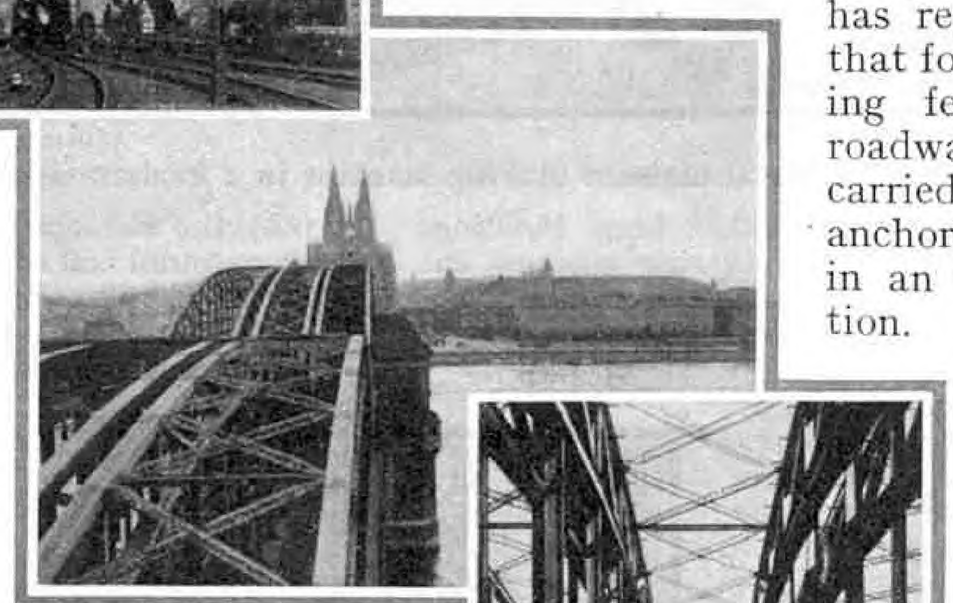
An Interesting Rhine Bridge

By Gerald W. Spink, M.A.

ONE of the finest bridges in Europe to-day is the Hohenzollern Bridge over the River Rhine at Cologne. At this point the river attains a breadth of nearly a quarter of a mile, and good communication across it is a matter of great importance. It is evident that this was the case in very early times, for we know that Constantine the Great (274-337) built a stone bridge over the river. This bridge was destroyed in the ninth or tenth century.

In 1828 a proposal was put forward to construct a tunnel beneath the river, but it did not meet with sufficient support and the scheme was never carried out. In 1850 the Prussian Minister of Trade and Public Works invited engineers of all nations to submit plans for a fixed bridge at Cologne, to unite the lines of railway between Belgium and France on the one hand, and Austria on the other. It was specified that the river should be crossed by a bridge that left three openings. The piers were to occupy in all not more than 75 ft., and they must be of sufficient strength to withstand the pressure of the fields of ice that descend the river in the break-up of great frosts.







Photos courtesy [*Reichsbahndirektion, Köln*

The Hohenzollern Bridge across the Rhine at Cologne. Above—The entrance to the bridge from the station; two of the equestrian statues may be seen. Centre—Unusual view of the bridge looking across the river towards the cathedral. Below—Looking along the centre section of the bridge.

Satisfactory plans having been obtained, the building of a lattice girder bridge was commenced in 1855 and completed in 1859. This bridge connected Cologne on the left bank with Deutz on the right, and had four spans of 322 ft. and a total length of 1,362 ft. It was the first railway bridge over the Rhine, and carried railway and highway traffic in separate spaces at a height of 47 ft. above average water level. This bridge ultimately became inadequate to deal with the growing traffic and it was superseded by the present Hohenzollern Bridge, built in 1907-11.

The new bridge has three spans of 390 ft., 551 ft., and 404 ft. in length respectively. Its most noteworthy feature is not its length, however, but its great breadth. It really consists of three big sections, two of which each carry two sets of metals for trains, while the third or southern section carries two tracks for electric trams, and is available also for motor and other vehicular traffic. In addition there is a wide pathway for pedestrians on each side of the tramway track. The height of the tracks above the normal level of the water is 46 ft. At each end of the bridge are fine stone arches with magnificent turrets. On the west, or Cologne side, are equestrian statues of Frederick III and William II; while on the east side, at Deutz, now a part of the city of Cologne, are similar equestrian statues of Frederick William IV and William I, which have been preserved from the old bridge.

Probably few bridges in Europe have a greater diversity of railway trains passing over them in the course of a day. Cologne is a great centre for routes that branch out into all directions in Europe—France, Belgium, Holland, Italy, Switzerland, Austria and the East, Latvia and Poland. There are also connections to and from England, Norway and Sweden, and Denmark. A large proportion of this immense international traffic naturally must pass over the bridge.

Two other bridges cross the Rhine close to the Hohenzollern Bridge. A little way upstream is a suspension bridge built in 1913-15, which has replaced the bridge of boats that formerly was such an interesting feature. It consisted of a roadway about 1,400 ft. in length carried upon a series of boats anchored permanently side by side in an up-and-down stream direction. At the upper end of the town is what is known as the South Bridge. This is a three-arch bridge, the centre span being 541 ft.; and it was completed in 1910. Its main purpose is to carry railway goods traffic, but there is also a pathway for pedestrians.

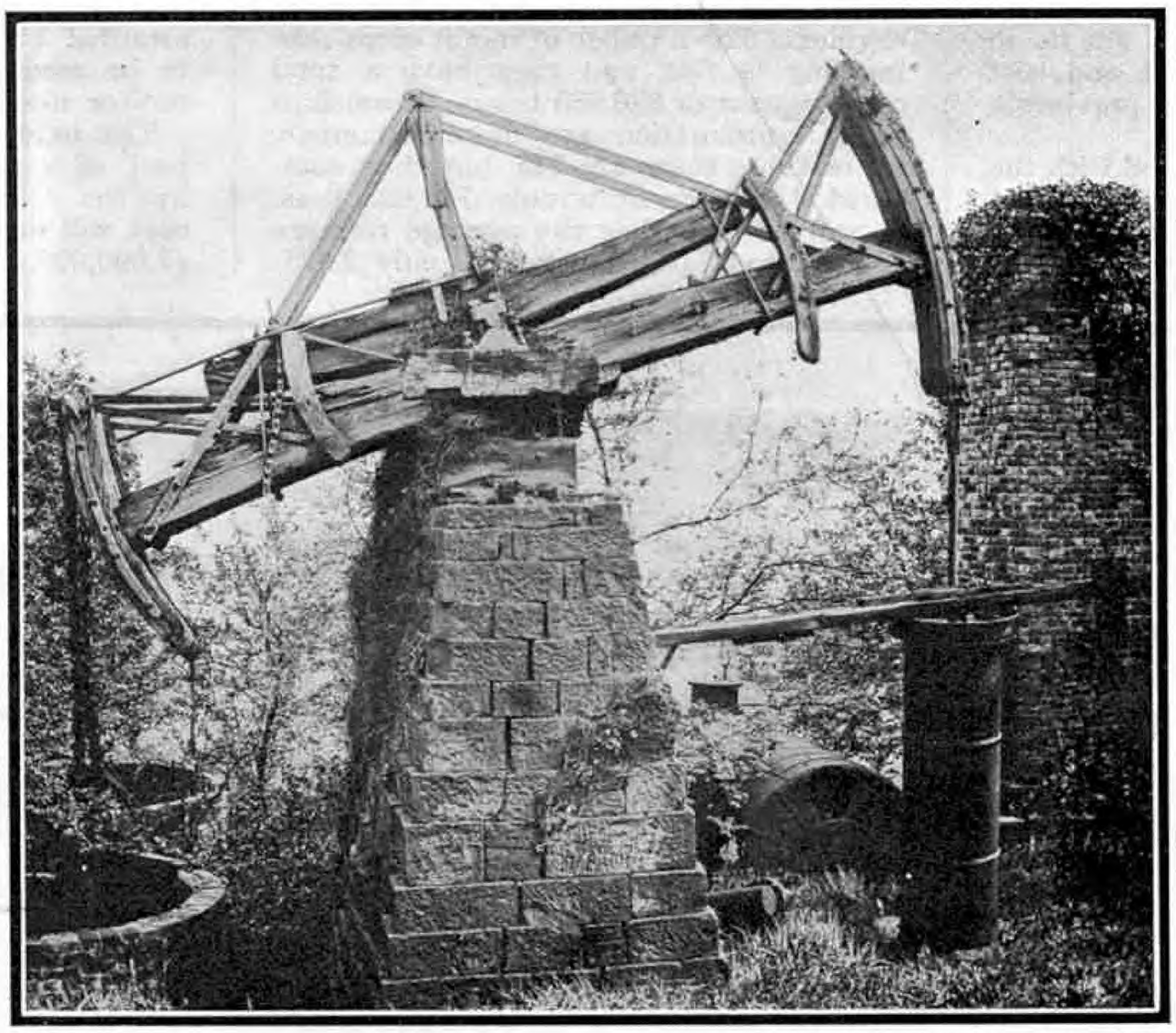
Cologne is the third largest city in Germany and has a population of nearly 700,000. It derives its name from the fact that a Roman colony, Colonia Agrippina, was founded there. It is an interesting fact that Cologne and Lincoln are the only cities of the old Roman Empire that have retained the titles of their Roman rank. The city lies in a half-circle, mainly on the left bank of the Rhine, and is dominated by the spires of its wonderful cathedral, which is one of the finest examples of Gothic architecture in Europe. The cathedral was commenced in 1248 and was not completed until 1880. It is built in the form of a cross, 480 ft. in length and 282 ft. in breadth; while the height of the central aisle is 154 ft. and that of each of the two towers that flank the west front is 512 ft. In a gold shrine in the cathedral treasure house are preserved the reputed bones of the legendary three kings, who were supposed to be the Three Wise Men who came from the East to pay homage to the infant Christ. The cathedral has a number of fine bells, the heaviest made from 22 cannon captured from France in 1871.

A Relic of Newcomen's Day

Atmospheric Engine that Pumped Water and Scared Crows!

TO all who take an interest in mechanical matters there is something particularly fascinating about an old engine. In looking at a relic such as that shown in the photograph on this page our imagination goes back to its inventor. We think of the problems that he had to solve, and how, in spite of obstacles of every description, he succeeded in achieving his object.

The engine illustrated is one of the original Newcomen atmospheric pumping engines that at one time were extensively applied to pumping operations in tin mines, coal mines, and elsewhere. This type of engine was invented in 1705 by Thomas Newcomen of Dartmouth. Unfortunately we know very little about this man, beyond the fact that he was an ironmonger or a blacksmith, or both, and probably was not in any sense an educated man. It is not known how he first came to study the subject of steam engines. According to one story, Thomas Savery, who had succeeded in producing a fairly successful steam engine, had employed Newcomen to make some of the more complicated parts of his engine. Whether this is so or not it seems to be clear that Newcomen knew of Savery's experiments and was thoroughly familiar with his engine.



Courtesy] [*W. H. Allen, Sons & Co. Ltd.*

Remains of an original Newcomen atmospheric pumping engine near Ashton-under-Lyne.

The Savery engines were used with some success for pumping operations, but they were not reliable. They easily got out of order, and attempts to obtain more work from them often resulted in the engine tearing itself to pieces, or in the boiler exploding. Newcomen set to work to produce an improved and more reliable engine, and with the assistance of one John Calley, or Cawley, a glazier of Dartmouth, he succeeded in 1705 in producing a model that worked fairly satisfactorily. It was a long time before he was able to produce a full-sized engine, however, but his chance came in 1711 when he was asked to build one for pumping purposes in a colliery near Wolverhampton. This engine was successful, and was soon followed by orders for others for different collieries and for the Cornish tin mines.

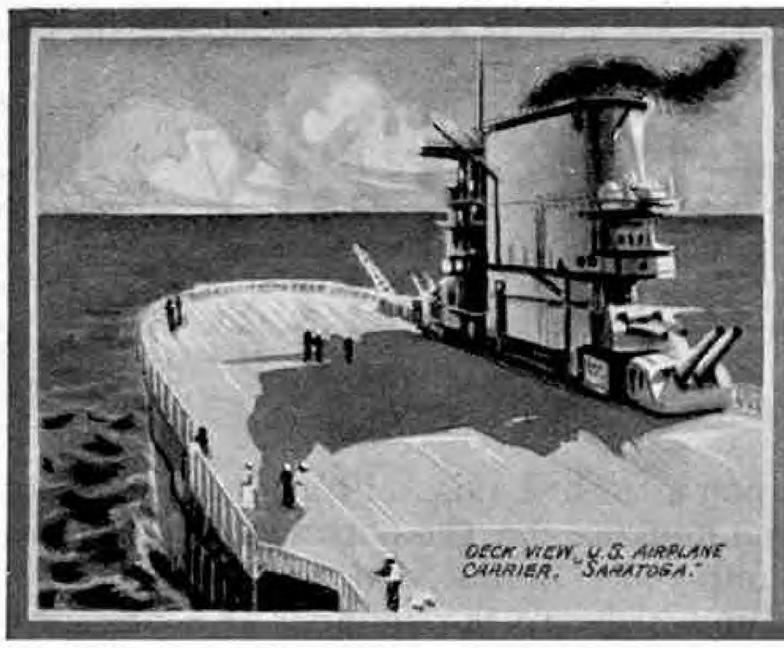
In Newcomen's engine a pipe fitted with a stopcock led from the top of the boiler to a vertical cylinder containing a close-fitting piston. The piston-rod was connected by a chain to one end of a beam overhead, which functioned see-saw fashion upon a central axis. From the other end of the beam hung a long weight, the bottom of which was attached to a pump-rod. Steam was generated in the boiler and passed upward into the cylinder at a pressure slightly greater than that of the atmosphere, thereby raising the piston. As the piston end of the beam was thus lifted, the other end was correspondingly lowered and the pump-rod depressed. This motion was assisted and steadied by the balance weight.

The stopcock was then turned to shut off steam. Cold water was passed down a narrow pipe from a cistern above the cylinder, entering the latter at the bottom in the form of a jet which, condensing the steam, created a vacuum. The cylinder was open at the top, and atmospheric pressure upon the piston immediately forced the latter down, thereby recanting the beam to its original position and raising the pump-rod. The descending piston forced out the injected water and condensed steam through an escape valve into a pipe leading down to an adjoining well. Steam was then re-admitted to the cylinder, and the cycle of operations was repeated.

Newcomen's engine thus was not a true steam engine, because the forcing down of the piston was effected by atmospheric pressure. But it paved the way for Watt's inventions, and thus led up to the wonderfully efficient engines of the present day. Newcomen does not seem to have made much money out of his engines, and his later life is shrouded in mystery. It is believed that he died in poverty at Dartmouth.

The engine in our illustration is still to be seen at Fairbottom near Ashton-under-Lyne, although its active career terminated nearly a century ago. It had a cylinder 28 in. in diameter, and the stroke of the piston was 6 ft. Steam was generated in a wagon boiler standing alongside the engine. It was formerly used for pumping water from the Cannel Mine from a depth of from 70 to 80 yards, and it was assisted in this work by a water wheel.

In addition to its pumping activities this engine had to perform another and rather curious duty, namely, that of scaring birds from the neighbouring crops! This was done by means of a cord tied to the centre of the beam and communicating with a "ricker" in the fields.



ENGINEERING NEWS

New Repair Ship for Navy

A new repair ship, or "floating shipyard," recently has been added to the British fleet in the Mediterranean Sea. The vessel has been named H.M.S. "*Resource,*" and was built at the Barrow yards of Vickers Ltd. She is 534 ft. in length and is easily the largest and best equipped of any of this type previously constructed.

The new repair ship is equipped with the necessary tools to enable the skilled workmen in her crew to carry out practically any work that is likely to be required when the fleet is at sea. Her only armament consists of four 4-inch guns for anti-aircraft work. She is fitted with light and heavy machine shops and many others devoted to trades of all kinds. These include a smithy and a foundry, and even a shop for the testing and repairing of the optical and scientific instruments that to-day form part of the necessary equipment of warships.

The "*Resource*" carries a very complete outfit of stores, and in addition to supplies of oil fuel, lubricating oil and water, carries large quantities of engineering and ship-fitting raw material. Thus parts needed to carry out a repair may easily be made on board. The ship has a number of electrically-operated cranes, and also is possessed of a powerful electric generator that will meet all needs likely to be experienced. Wireless telegraphic apparatus naturally is carried on board, and it is claimed that this is of a sufficient range to enable messages to be sent anywhere in the world.

It is interesting to find that among the tradesmen on board are sailmakers, pattern-makers, plumbers, and mechanics to repair internal combustion engines.

Long-Distance Bus Service

A new regular service of double-decked omnibuses to carry 40 passengers and their luggage has been inaugurated between Edinburgh and London. These new coaches will make the journey of about 400 miles in one day, leaving early each morning. Night coaches with sleeping accommodation also are being run.

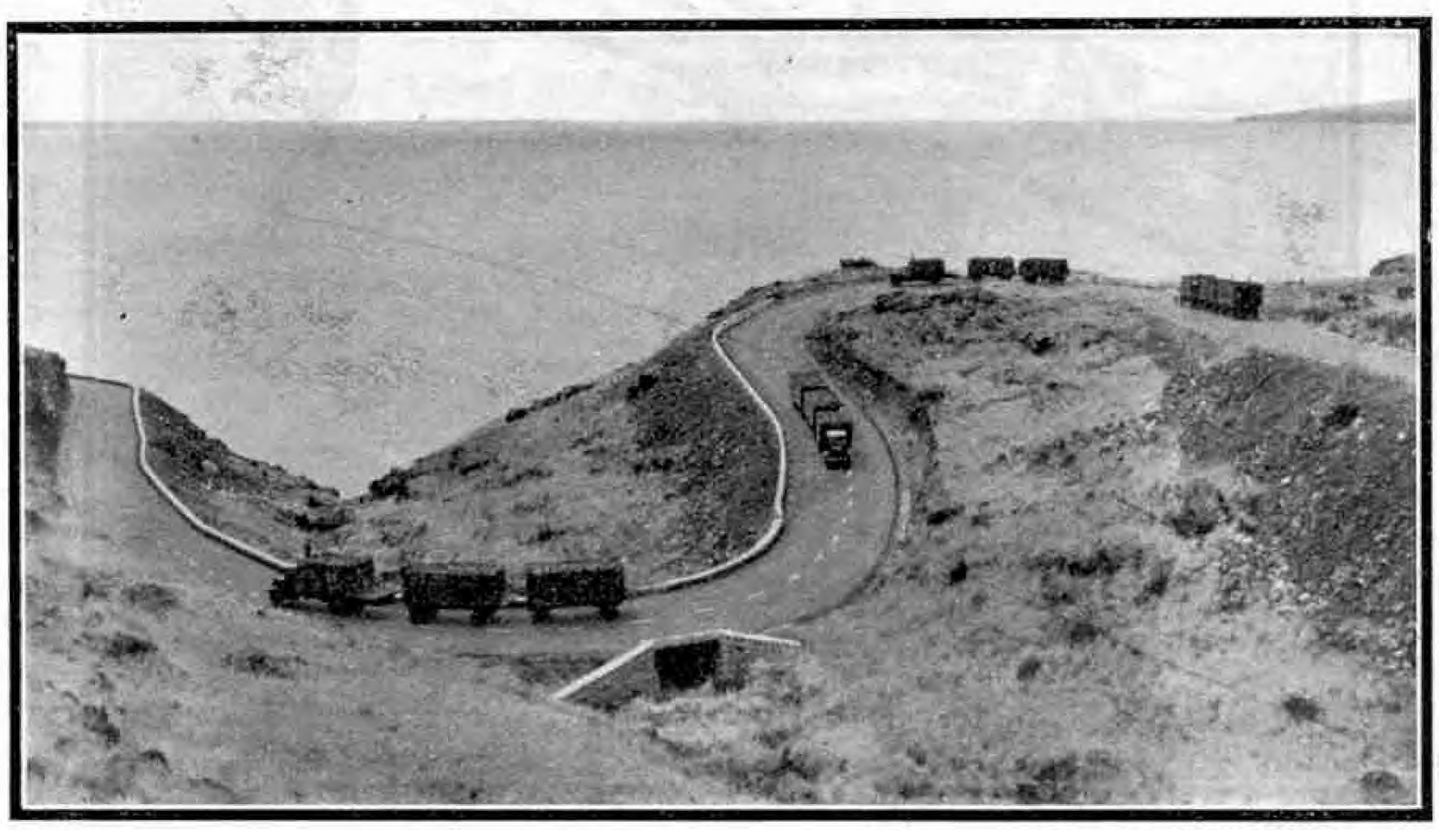
Motor Ships Make Further Progress

For the first time in the history of British shipbuilding the tonnage of motor vessels under construction in the shipbuilding yards of the country is greater than that of ships to be driven by reciprocating steam engines. The number of motor ships now building is 139, and they have a total displacement of 876,960 tons. Steamships under construction are more numerous, for of these there are 215, but their combined displacement is only 730,033 tons. It will be seen that the average tonnage of the steam driven vessels is only 3,425, and this is a little more than half that of the motor ships.

The increasing popularity of the motor vessel is also shown by the number of ships of this type being built in other countries. In foreign yards 225 motor ships, with a total displacement of 1,054,402 tons are under construction, while the number of steamships building is 204 and their displacement amounts to 571,584 tons.

Crane Built of Aluminium Alloy

The main structural members of a 10-ton travelling crane recently constructed at Massena, New York, are made of aluminium alloy. The bridge of the crane is built up of two double-web girders with a span of 72 ft. 2 in. These girders are slightly larger in cross section than would have been necessary if they had been made of steel, but it is claimed that the use of the lighter alloy has effected a total saving in weight of more than 12 tons.



Courtesy] [*Hawaiian Pineapple Co. Ltd.*

Road-building on a Pacific Island. This fine road was built by the Hawaiian Pineapple Co. Ltd., on the island of Lanai, to carry their heavy loads of pineapples from the fields to the harbour. It winds upward along the cliffs to a height of 1,600 ft., and penetrates seven miles inland. (See article on page 434).

Navigating Developments in Canada

The Canada Steamship Lines Ltd. has decided to add a 2,500,000-bushel unit to their grain elevator at Kingston, a port at the eastern end of Lake Ontario. The contract for its construction has been awarded to a Winnipeg firm, and it is to be ready for operation by 15th September next.

The extension of this elevator is only part of a development scheme projected by the Canada Steamship Lines Ltd., that will involve an expenditure of about £1,000,000. This will make Kingston an important transfer point in the shipment of grain from the ports of the upper Great Lakes. It is expected that later in the year the Welland Ship Canal will be ready for traffic, and then large vessels will be able to pass down the Great Lakes to Kingston, where they will discharge their cargoes into smaller vessels that will take the grain through the canals of the St. Lawrence River to Montreal.

Interesting developments also are taking place at Prescott, a port on the St. Lawrence river, between Lake Ontario and Montreal. There the Dominion Government is building a huge elevator and docks in order to facilitate the transfer of grain shipments.

A More Destructive Torpedo

After much experimental and research work, the Whitehead Torpedo Company Ltd. have developed a new type of torpedo. In diameter, this is three inches less than the older type, but the speed, and the destructive power of the explosive in the warhead, have been greatly increased. An important feature of the new design is that the customary double-acting two-cylinder engine described in the article on the Whitehead Torpedo that appeared on page 114 of the "*M.M.*" for February, 1930, is replaced by one that has eight cylinders.

The experiments on the new form of torpedo are being carried out at the Whitehead Torpedo Company's range, situated between Weymouth and Portland. It is stated that numerous foreign powers are interested in the new weapon.

A Record Natural Gas Pipe Line

A natural gas pipe line of record size is being laid from Kettleman to San Francisco, in the United States. It is 26 in. in diameter and 200 miles in length, and is the second line to be constructed within a year as a result of the discovery of a remarkable natural gas field in the Kettleman hills. The huge pipe is electrically arc welded, and is being put down at the extraordinary speed of a mile a day.

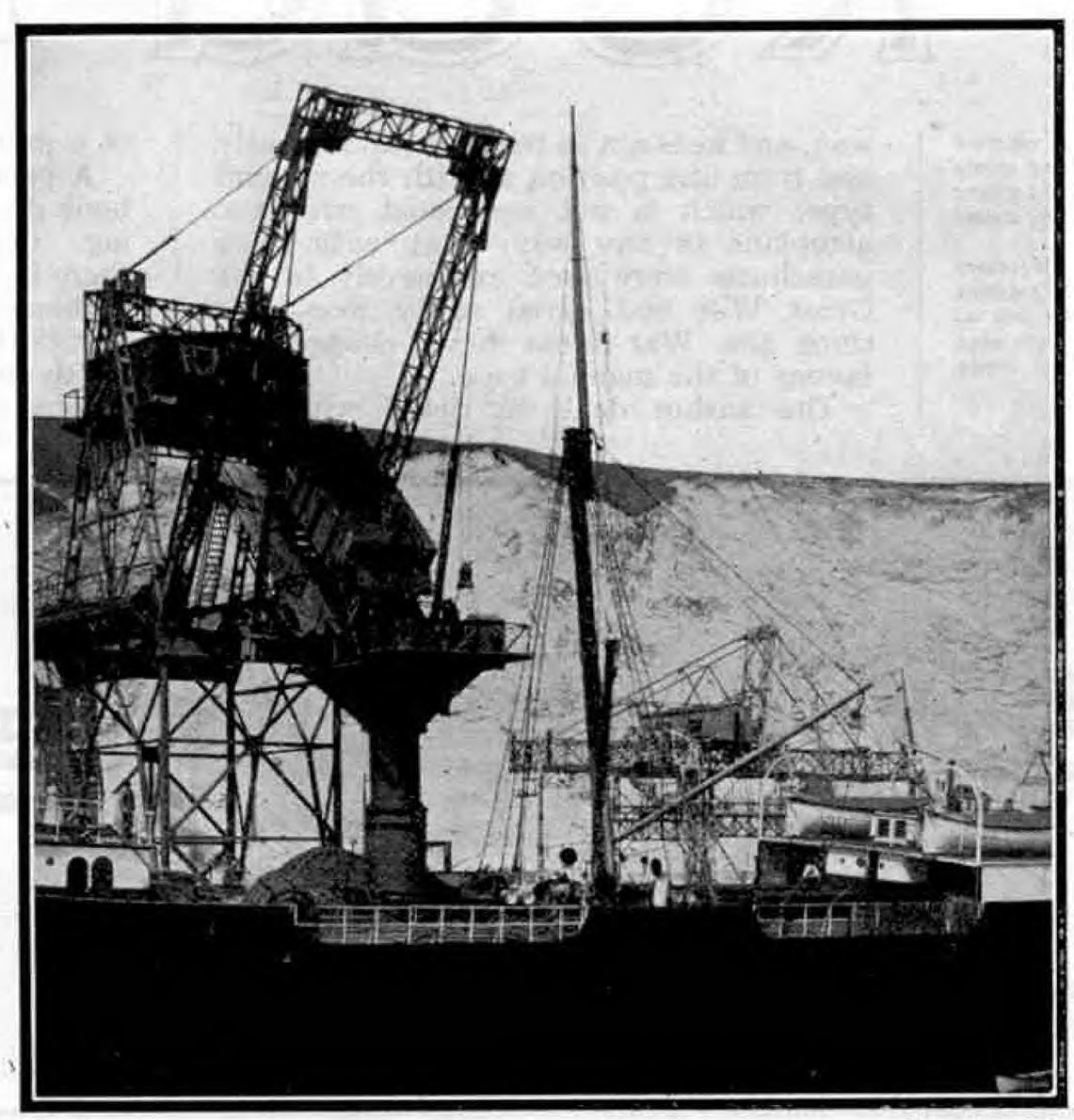
The trench is dug by a ladder type excavator working 24 hours a day. This keeps well in advance of the main-laying gang in order to ensure that the latter are not held up. The pipe itself consists of 40 ft. lengths, each weighing about two tons. These are handled by a crane mounted on a lorry that runs alongside the trench and places the pipes on supports ready for welding. The pipes are rolled over by the construction gang while the welder goes over each joint twice, taking about 15 minutes per circle. After welding, the pipe is given two coats of asphaltic paint and a tractor crane then lowers it into the trench.

An even greater task than the construction of the Kettleman-San Francisco pipe line is proposed by the Chicago Gas undertaking. Negotiations have been completed for the construction of a natural gas pipe line, no less than 950 miles in length, to convey gas from the district known as the "Texas Panhandle" to Chicago. This pipe probably will be 22 in. in diameter and it will be laid in such a manner that parallel mains can be provided at a later date.

New Whaling Vessel Built on the Tyne

A large new "whaling factory," named the *"Taselberg,"* has been constructed at the Walker-on-Tyne yards of Sir W. G. Armstrong Whitworth & Co. Ltd. The vessel is claimed to be one of the best equipped whalers of this type now in existence. It is capable of dealing with whales as large as any yet met with, and the whole process, from hauling the creatures on board to reducing them to oil, fertiliser, and other products, is carried out on the vessel itself. The ship is of 25,000 tons deadweight, and its cost is more then £330,000.

Although whaling factories such as the *"Taselberg"* are of comparatively recent introduction, they are rapidly ousting the older type of whaler, the crews of which had to work on the dead whales lashed to the sides. The total number of factories now cruising in the Antarctic is about 23, and about 150 other vessels are employed in searching for whales and capturing them. Some idea of the proportion that the whaling industry has attained may be gathered from the fact that recently a single floating factory brought home cargo worth £570,000.



Courtesy [*Demag A-G*

An electric swing tipper constructed for use in coaling vessels in the harbour of Gijon, Spain. The coal is easily slid into the bunkers by swinging the tipping platform forward.

Proposed New Bridge at Middlesbrough

It has been proposed to construct across the River Tees at Middlesbrough a bridge of a type never previously built in the British Isles. This would be erected at the Newport end of the town, and would cut off a detour of eight miles for traffic between Middlesbrough and Billingham. The structure planned is of the vertical lift type that has become popular in Canada and the United States. In the former country a number have been constructed across the Wellend Ship Canal.

The lift span of the proposed bridge is 250 ft. in length. When necessary in order to allow the passage of shipping, it would be raised to the top of the supporting piers in two-and-a-half minutes. The engineer responsible for the preliminary plans has so much confidence in the efficiency of the lifting machinery that his firm has agreed to pay a heavy penalty if the span cannot be raised in the stated time.

The estimated cost of building the bridge is £616,000. This sum compares very favourably with the cost of a tunnel to accommodate an equal volume of traffic, for this would involve an expenditure of £3,500,000. A further point in favour of the project is that the upkeep of a tunnel would be much heavier than would that of the bridge.

World's Largest Rolling Mill

A steel rolling mill that will be the biggest of its kind in the world is now being constructed at Sheffield. The mill is being built in the most modern style, and a feature of interest is that the control of all motors will be centred in a position from which every part of the works will be visible.

The roughing mill in the works will be driven by a 700 h.p. motor, while four other 700 h.p. drives will operate the finishing stands. A 1,500 h.p. drive is provided for intermediate mills. The mill will probably specialise in the production of sheet, bar and rods, but when required it will be able to produce other semi-finished and finished steel products.

Hydro-Electric Power Scheme for Italy

Work has been commenced on a big Italian hydro-electric scheme that calls for the construction of an underground tunnel, 25 miles in length, through which 5,000,000 gallons of water per minute will flow. This will be fed by the Nera, a river that flows into the Tiber at a point 35 miles north of Rome, and three other streams in the neighbourhood, and the courses of all four are to be diverted in order to make use of them in this manner.

The underground canal is to be constructed with a slope of one in 140. The water will flow down to a generating station that is being constructed at Galleto, where it will operate turbines developing 50,000 h.p. It is expected that eventually this station will be enlarged to develop 400,000 h.p., and an auxiliary scheme provides for the construction at Recentino of a second station to develop 150,000 h.p.

It is expected that the Galleto project will be completed in the spring of 1932, and until then it will provide regular employment for about 4,000 workmen. A number of men also will be employed for some time on the construction of two huge reservoirs to hold a total of 70,000,000,000 gallons of water. These will be fed by the waters of the River Velino.

In addition to providing electricity and work for a number of men, this hydro-electric scheme will be greatly to the advantage of farmers in the district, for it will prevent the occurrence of sudden devastating floods of the kind that previously were experienced in the district.

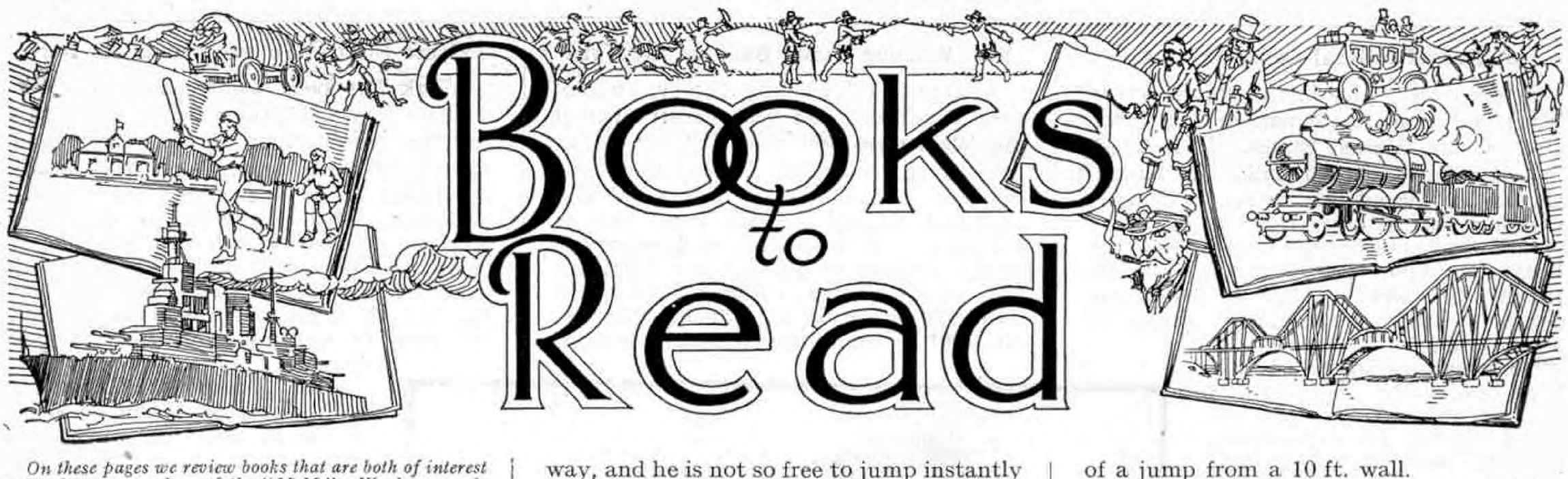
England's Tallest Crane

Further details are now available of the huge mono-tower crane at Liverpool, mention of which was made in the *"Engineering News"* of our last issue. The crane was constructed by Butter Bros. & Co., of Glasgow, and cost £3,500. The operating box is 182 ft. above ground level. This means that on his way to work the driver has to climb 182 rungs up a vertical ladder!

During official tests, four tons of stone were lifted to a height of 290 ft. at a rate of 60 ft. per minute. After this the stone was lowered until it was 160 ft. above the ground, and at this height it was readily swung round, describing an arc of radius 117 ft. It is interesting to note that Britain's second tallest crane, which is in London, is capable of lifting a weight of four tons of stone to a height of 245 ft.

367 Miles on One Gallon!

An extraordinary record recently was set up in South Africa by a motor cyclist who travelled a distance of 367 miles on one gallon of petrol! The feat was performed by Mr. D. Donaldson, a member of the Natal M.C.C., and he was riding a 300 c.c. side-valve J.A.P.-engined O.K. Supreme, in a petrol consumption test. The figures set up are thought to constitute a world's record.

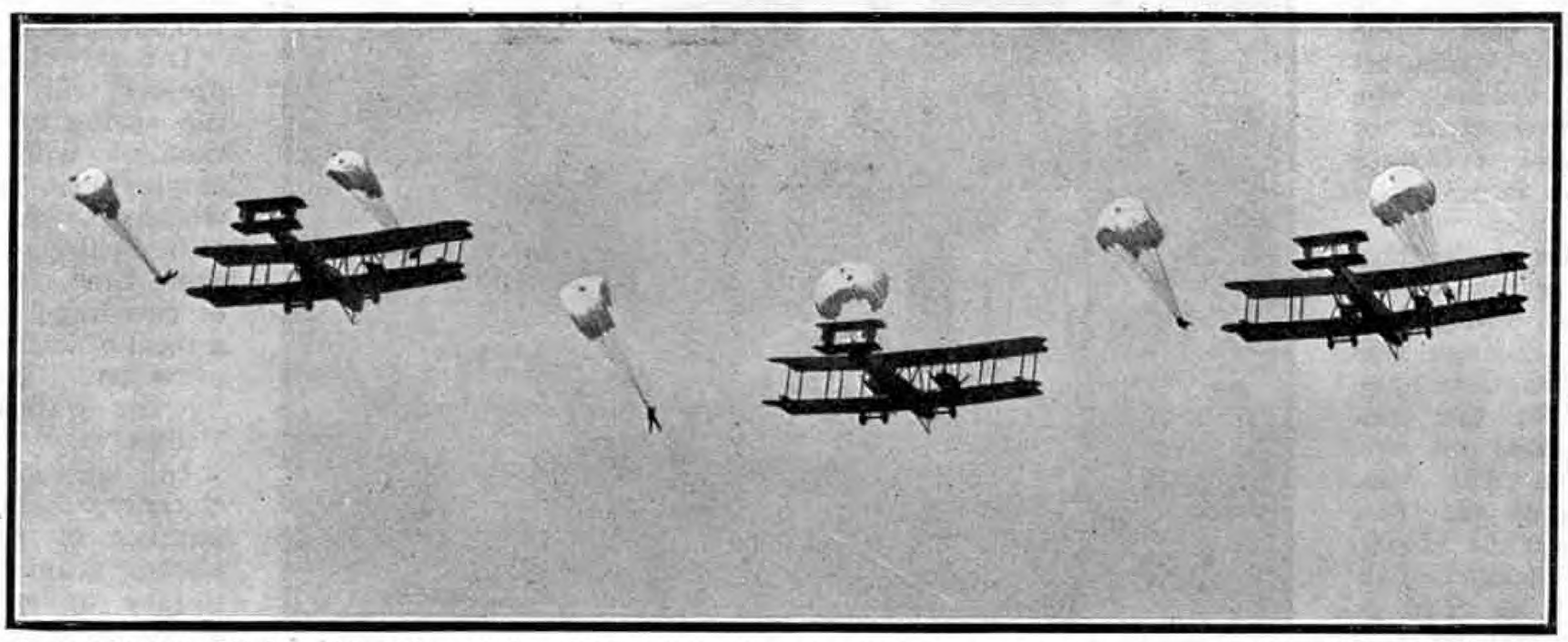


On these pages we review books that are both of interest and of use to readers of the "M.M." We have made arrangements to supply copies of any of these books where readers find difficulty in obtaining them through the usual channels.

Orders should be addressed to the Book Dept., Meccano Limited, Old Swan, Liverpool, and 1/- should be added to the published price of the book to cover the cost of postage. The balance remaining will be refunded when the book is sent, as postages on different books vary according to the weight and destination.

"Parachutes for Airmen"

By
CHARLES DIXON
Pitman & Sons
Ltd. 7/6 net)



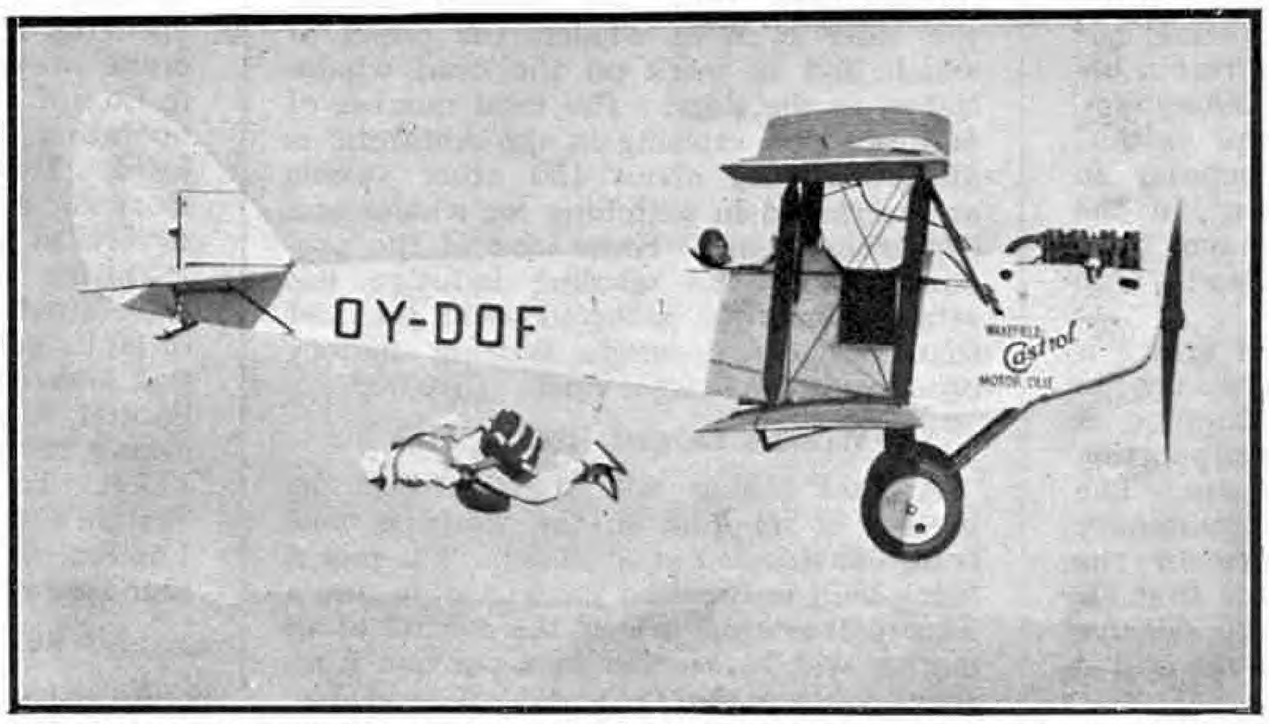
A mass descent of R.A.F. airmen from Vickers "Vimy" Bombers at an R.A.F. pageant at Hendon. Instead of jumping from the cockpits the parachutists have climbed on the wings of the machines and pulled their release rings at a given signal. Each canopy has then opened, filled with air, and dragged the man off the wing. This is an example of the training methods for parachuting. (See below).

The parachute appears destined to play a very important part in the development of transport by air, yet little attention is paid to it by the general public. Still more remarkable is the neglect of it in certain aviation circles. It is undoubtedly true that the safety factor in modern aircraft is very high. The same applies to the modern ship, yet we should not think of embarking on a voyage in a vessel that carried no lifebelts, which are the sea equivalent of the parachute.

Mr. Dixon explains in an interesting manner the principle of the parachute, and outlines the respective merits of the automatic type and of the manual type that has to be released by the user by pulling a ring attached to a cord. The automatic type seeks to relieve the parachutist of the responsibility of operating the apparatus as he falls. It certainly guards against an airman being killed as the result of failing to release his parachute through forgetfulness, or loss of consciousness due to fright, but it involves certain dangers. It is brought into action by means of a line attached to the aeroplane, the parachute being released from its pack when the end of the line is reached. The airman must take constant care that this line is not entangled in any way, and he is not so free to jump instantly and from any position as with the manual type, which is not connected with the aeroplane in any way. Automatic type parachutes were used extensively in the Great War and saved many lives, but since the War ideas have changed in favour of the manual type.

The author deals in detail with the parachutes that are now in most general use. The essentials of a good parachute are rapid opening and a slow rate of descent. The "Irvin" 24 ft. diameter type, for instance, opens in $1\frac{3}{5}$ seconds from the time the ring is pulled, and it descends at the rate of 21 ft. per second. In normal weather conditions, with a moderate wind, the user of this type lands with about the force of a jump from a 10 ft. wall.

A particularly interesting section of the book describes the sensations of parachuting. Contrary to what one would expect, there is no unpleasant sensation of falling. Although the parachutist is aware of the fact that he is falling, his feeling is one of gently floating in space, while the earth climbs gradually towards him.



Diving from the bottom wing of a de Havilland "Moth" light aeroplane. The parachutist is falling free to clear the machine before the parachute opens. (From "Parachutes for Airmen" reviewed on this page).

A difficult problem arises in connection with commercial cabin aircraft having one exit for passengers. Even if the passengers were provided with parachutes it is extremely improbable that they could all pass through the door and drop out of the machine quickly enough. A collapsible cabin floor, or side, through which all the passengers could drop at once, might meet this difficulty. The only alternative seems to be a large parachute capable of bringing the whole machine down in safety, and this is more feasible than might appear at first consideration. A huge "Russell" type parachute, 65 ft. in diameter, and attached to an aeroplane, has already been tested for this purpose. A pilot took up the aeroplane, released the parachute, jumped out with his own parachute, and left the machine to descend. Apart from some slight damage to the under-carriage the experiment was successful.

This interesting book is well provided with photographs showing actual descents, and illustrating different types of parachutes and the method of packing and wearing them. The successful release of a parachute depends upon its easy and rapid escape from its container, and therefore systematic and careful packing is necessary in order to guard against the possibility of the canopy becoming entangled with the shroud lines.

"The Medway River and Valley"

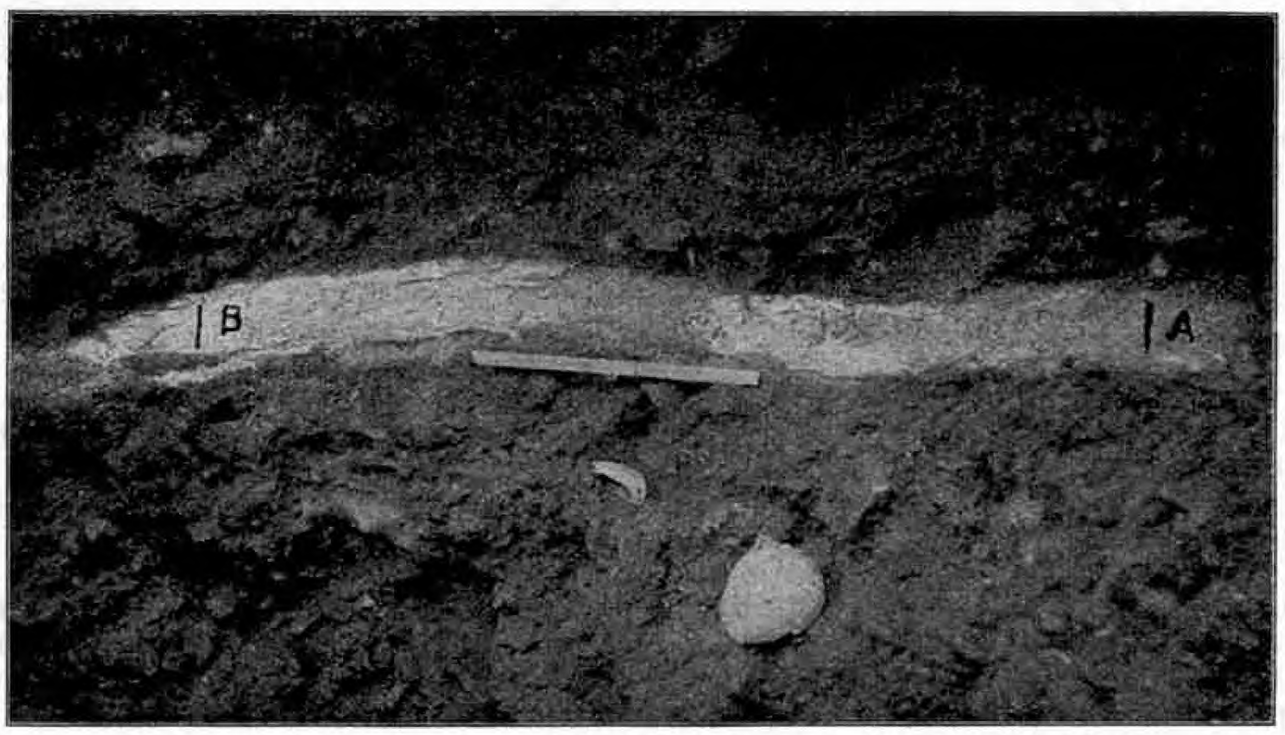
By W. Coles Finch
(C. W. Daniel Company. 10/6 net)

The story of every river is the story of the generations who have lived and died along its banks; but the story of many rivers goes far beyond this and reflects to a large extent the course of national life. This is particularly the case with the Medway, which has historical associations that few rivers can surpass. Its story is told by Mr. Coles Finch in his latest book, "*The Medway River and Valley*," and in his hands the river becomes a living romance. In this, as in his previous book, "*In Kentish Pilgrim Land*," the author has brought a genuine interest and sympathy and a far-seeing mind into collaboration with a gifted pen and brush, with the result of a valuable addition to the all too scanty literature of our native land.



A house in the Medway marshlands that was formerly a smugglers' retreat. (From "The Medway River and Valley," reviewed on this page).

The Medway has always been peculiarly tempting to the invader, and its story presents a remarkable contrast with that of rivers—many of them far larger—that have rolled quietly along through the centuries with little to disturb them. Not only is the Medway easily accessible, but its tidal length makes possible deep penetration of the country, and thus its waters have borne Phœnicians, Greeks, Romans, Danes, Dutch and French. Mr. Coles Finch takes us back to prehistoric times and shows how splendid and varied must have been the animal life of early Britain. The hippopotamus wallowed in the Medway, elephants wandered along its banks, and in the surrounding jungle regions lurked the tiger. Man was there too, maintaining himself among the fierce creatures of the wild by superior cunning, ceaseless watchfulness, and the aid of his crude flint weapons. Ten thousand years or so ago the Medway region was an archipelago of rush-covered islands where Man lived in pile dwellings, and forest and river provided him with the necessities of life. From his first boat of a dug-out tree trunk he progressed to build canoes from tree boughs covered with skin. He learned to light a fire; to make bronze tools and implements for use in the operations of everyday life, and bronze weapons to enable him to combat more successfully his enemies, both Man and beast.



Mammoth's tusk, 9 ft. in length, found in a clay pit near Chatham (see above).

Among the earliest visitors to our country were the Phœnicians, those enterprising sea traders who came here in search of tin. Then came the Romans, who looked with contempt upon the pastoral habits of the peaceful folk that inhabited the Medway banks. The district flourished under Roman rule, however; pottery-making and other crafts developed, and Rochester became important as the fording place of the Watling Street. After the Romans had left Britain the Jutes came and promptly made havoc of the work of their predecessors. The conditions in the country became so seriously unpleasant that the Saxons were invited to come in to resist the Jutes. The Saxons gave to this region the name Sheppey, or Sheep Island. A great step forward in progress was made when Ethelbert, the Saxon king, became a Christian, and his example was followed so widely that about that time there were more than twelve thousand folk baptised in the Swale, which is a portion of the Medway. These invading nations differed as much from one another as they all did from the native people, and yet by the twelfth century all had blended into the English race.

Later came the prolonged struggle with the Dutch and the French on the Medway, in the course of which the river was littered with sunken ships. The splendid English vessel "*Royal Charles*" was captured by the Dutch through naval lethargy. These troubles followed plague and fire in London, and the days were full of difficulty and danger. Gradually peace settled down again on the Medway, but the river once more came into prominence in the Great War when the airship above and the submarine beneath menaced the land.

The second section of the book deals with smugglers and their wiles. As we read we discover that contraband articles had the same fascination for the people at that time as they have for us to-day; and that the taxpayer of that day was in no way behind his fellow-sufferers of 1930 in the energy and wholeheartedness of his protests! The ingenuity of the smugglers in their wild escapades makes thrilling reading, and we realise the loyalty and unflinching courage of these rough law-breakers.

In the last section of his book Mr. Coles Finch takes us on a wonderful journey through the garden of England traversed by the river. The old bridges that carried the roads are illustrated and described with enthusiasm, and in reading of the old chapels on these bridges and the tax for crossing we obtain an instructive peep into other days and ways. The story of the sea reaches of the Medway has a peculiar fascination of its own, and one does not easily tire of reading of things that have passed away. The sight of Upnor Castle takes us back to the Dutch wars; the Dockyard extension reminds us of convict labour that has merged into the work of the Borstal Institution not far away; Chatham has its own intimate associations with many great and daring men of other days. From Rochester to Allington and on to Tunbridge completes a journey and a survey that is interesting to the end.

No book of this nature can be satisfactory without a plentiful supply of illustrations, and in this respect the author has been unusually generous. The illustrations are not only interesting in themselves, but they have been selected with such care as to form a pictorial story that adds enormously to the value of the book.

Mr. Coles Finch has interpreted for us in glowing terms the inner life history of the Medway valley and brought before our eyes its many beauties, always characteristic but often hidden from the casual eye. He has indeed given us a volume that should be read and treasured by all who love England.

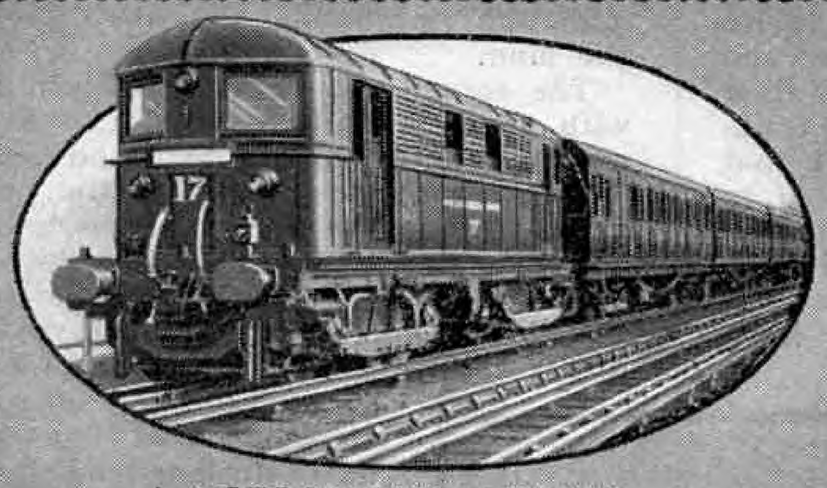
(Rev.) J. Henry Martin.

Interesting New Books

We hope to deal with the undermentioned books in an early issue.

"The World's Aeroplanes and Airships"
by G. Gibbard Jackson.
(Sampson Low, Marston Co. Ltd. 6/-)

"Enigmas: Another Book of Unexplained Facts"
by Lieut.-Com. Goulds.
(Philip Allan & Co. Ltd. 12/6)



A METROPOLITAN TRAIN

RAILWAY NEWS

L.N.E.R. Locomotive News

The eight 4–6–2 super "Pacifics" that were put on order last year are now being completed at Doncaster. They are numbered 2595–9 and 2795–7, and are to be stationed in the North Eastern and Scottish areas. No. 2595 "*Trigo*" and No. 2596 "*Manna*" are already in service and are shedded at Gateshead. No. 2595 is fitted with a new type of superheater that is known as the "Long Loop" superheater. The new engines work at a boiler pressure of 220 lb. per sq. in. Their tenders are of non-corridor type, but are similar in appearance to those that were fitted with corridors.

On the completion of these engines, the L.N.E.R. will possess 70 "Pacifics" of Mr. Gresley's design. In addition, there are five North Eastern type Pacifics, these being all stationed at Gateshead.

Engine No. 336 "*Buckinghamshire*," a locomotive of the three-cylinder 4–4–0 type that has Lentz rotary cam poppet valve gear, has been running fitted with a shelter and apparatus for taking indicator diagrams.

Engines of the J 39, 0–6–0 class are now to be seen at work on almost all parts of the L.N.E.R. Many of the latest built have been allocated to the G.E. section.

London-Brighton Electrification

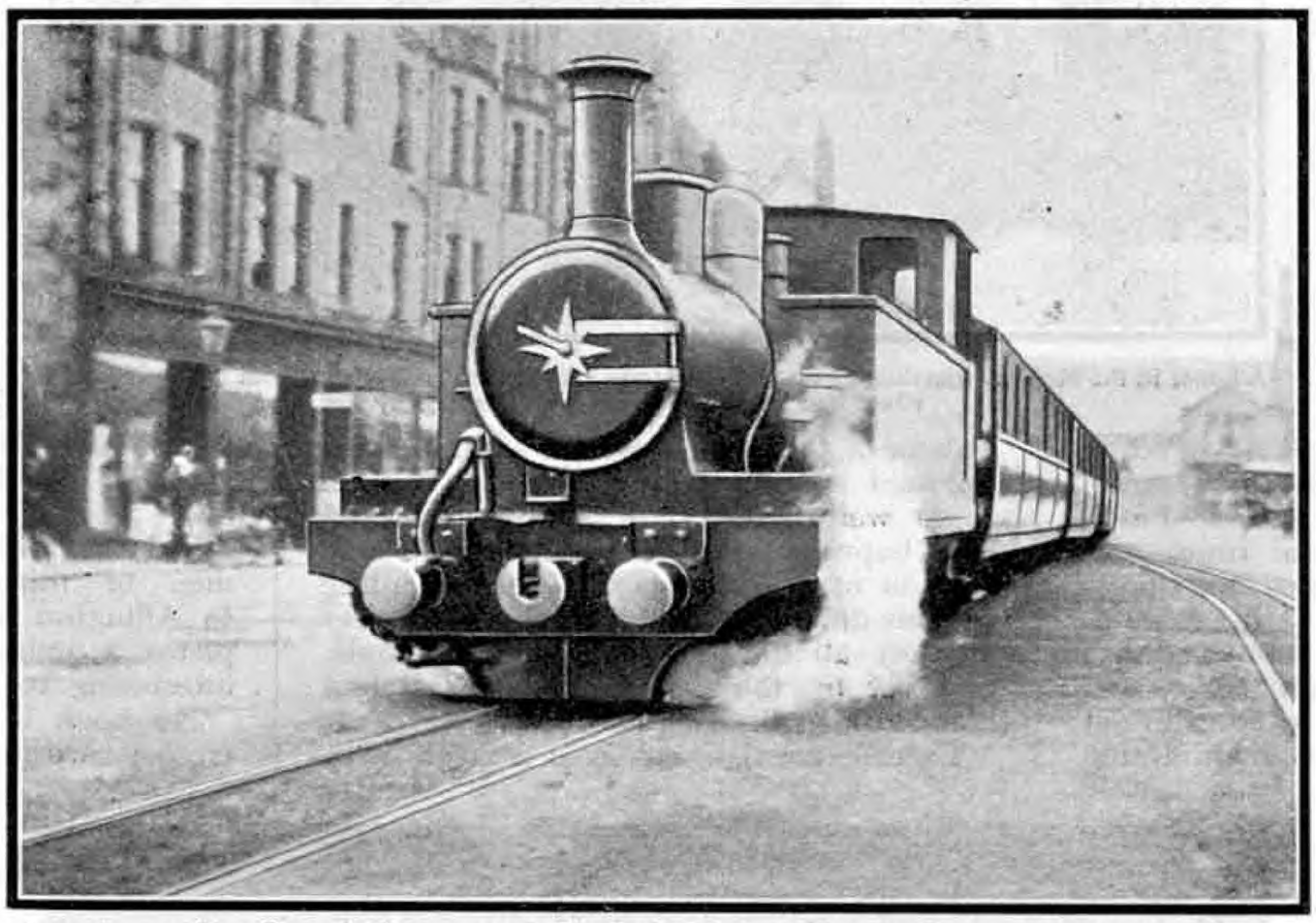
When the Southern Railway decided to electrify the main line from London to Brighton, one of the most important points that had to be settled was whether the trains should be worked by electric locomotives or on the multiple unit system. It was resolved, after the fullest consideration, to adopt the latter system which is the one already employed on the Southern suburban services. It is proposed to run non-stop trains between London and Brighton every hour during the day; another hourly service between London and Worthing, calling at three or four intermediate stations; and also a service of semi-fast trains between London and Brighton and Worthing. For the present steam train mileage of about 1,972,000 miles per annum there will be substituted an electric train service with a mileage of about 4,921,000, showing an increase of no less than 150 per cent.

Educational Excursions of the "Southern"

For several years past the G.W.R. have run excursions to their works at Swindon. These have been very popular and attracted tens of thousands of interested visitors. Now the Southern Railway have followed this excellent example, and on Tuesday, 29th April, the first excursion of this kind was run to the works at Eastleigh. This was a great success and a large number of passengers—mostly boys, and many of them "*M.M.*" readers—travelled by the special train, which was drawn by engine No. 865, "*Sir John Hawkins*" one of the locomotives of the famous "Lord Nelson" class.

On arrival at Eastleigh the visitors were divided into parties and conducted over the works. Outside the erecting shop a brand new 3-cylinder 4-4-0 engine of the "School" class—No. 903, "*Charterhouse*"—was on view, together with No. 789, "*Sir Guy*" of the "King Arthur" class.

Another remarkable excursion was run by the S.R. on Monday, 28th April, when 1,500 public schoolboys, members of the Crusaders' Union, travelled to Southampton. There they visited the docks where, among many interesting sights, the White Star liner "*Olympic*" was open for inspection. Two trains were required to convey this huge party. Both were drawn by engines of the "Lord Nelson" class and non-stop runs were made in each direction, the 79½ miles being covered in 90 minutes.



A train on the Campbeltown and Machrihanish Light Railway, Argyllshire. This line is of 2 ft. 3 in. gauge and is six miles in length. The train is seen proceeding along the public street, a very unusual practice in Great Britain.

Developments on G.W.R.

The 20 engines of the new 0–6–0 type that were ordered to be built at Swindon have now been completed and all are in traffic. They are numbered from 2251 to 2270.

The new "Kings" are nearing completion. The general design corresponds to that of previous engines of this class, but many improvements have been made in smaller details. Important alterations have been made, for instance, in the journals and axle boxes of the bogie wheels, and the journals have been shaped to form collars for the boxes to work against. Alterations also have been made in the cheek-plates of the engine axle boxes. In the earlier "Kings" they were of cast-iron, chilled or hardened on the face of the plate. In the new engines bronze shoes are fitted and the axle boxes will therefore work against bronze instead of iron as formerly. It is hoped that these surfaces will tend to eliminate friction and make for easy and cool running.

Engine No. 4057, "*Princess Elizabeth*," has been to Swindon for repairs and has received new cylinders with outside steam pipes, but the boiler and cab have not been altered. As and when the older engines that have two outside cylinders require new cylinders, it is now the practice to fit outside steam pipes, similar to those of the "Hall" class, instead of having the pipes inside the smoke-box as previously. Several engines of the 4500 2–6–2T class have been so fitted and also No. 4200 (2–8–0T).

One hundred locomotives of the 0–6–0 tank type have been ordered from four British firms at a cost of more than £250,000.

Oldest British Locomotive in Service

It is claimed that the Southern Railway Company's locomotive No. W13, "*Ryde*," is the oldest passenger engine in active service in the United Kingdom. It is a 2–4–0 tank engine and was built in 1864 for the Isle of Wight Railway by Beyer Peacock & Co. Ltd. During its life of sixty-six years, it has run 1,502,638 miles, and it still seems good for more years of satisfactory service.

New L.M.S. 2-6-2 Tank Locomotives

The first of the 50 new L.M.S. 2–6–2 Passenger Tank Locomotives referred to in these pages of the "*M.M.*" for December last have now been put into service. The first engine of this class was handed over to the Motive Power Department in March, and since then several more have made their appearance, Nos. 15500-4 being now employed on the Wirral section.

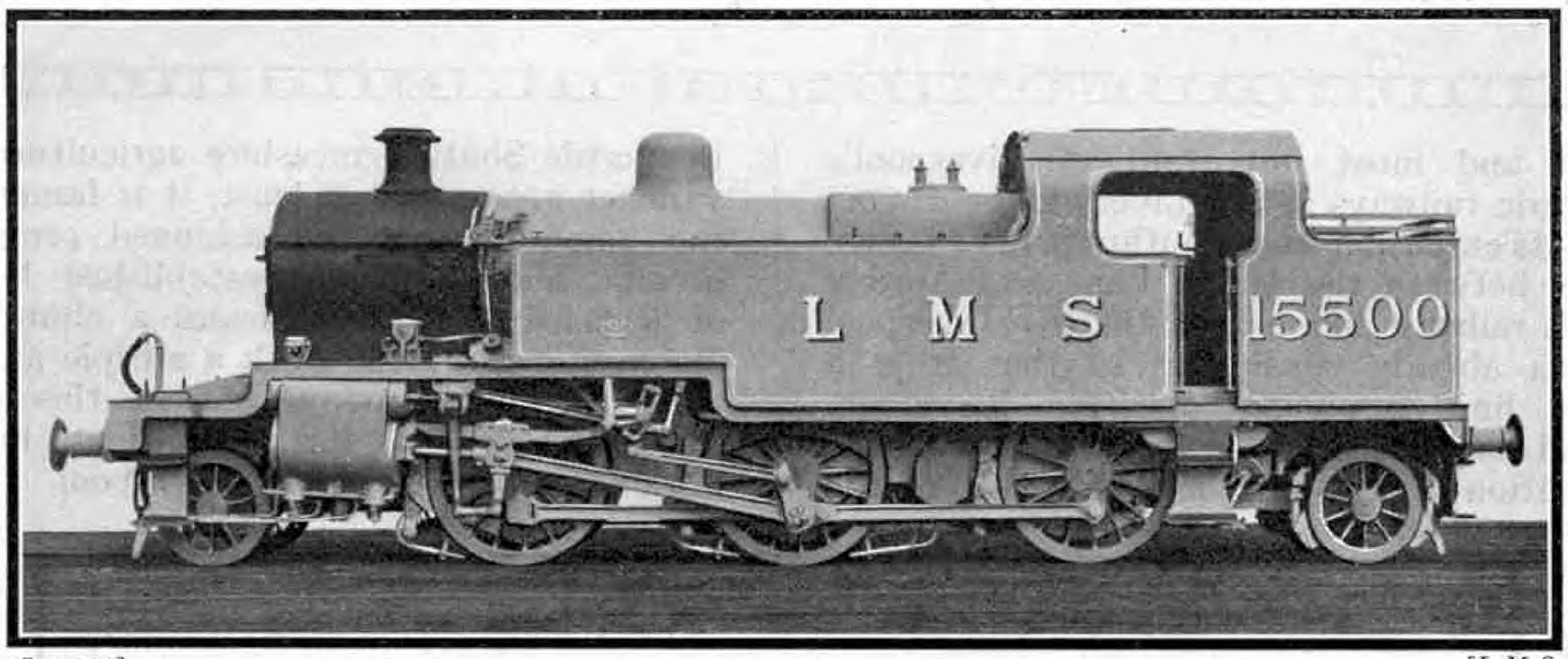
These locomotives have been built at Derby to the designs of Sir Henry Fowler, the Chief Mechanical Engineer of the Company. They have been introduced to work suburban passenger trains, and it is interesting to note that 20 of them are being fitted with condensing gear and a special vacuum trip cock gear. Those equipped in this manner are to be stationed in the London district and have been so fitted in order to enable them to work over the Metropolitan lines. As will be seen from the illustration of No. 15500 reproduced on this page, the locomotives have outside cylinders, the dimensions of these being 17½ in. diameter by 26 in. stroke. Walschaert valve gear is employed and the crosshead is of the single bar type.

A standard superheated boiler is used, the working pressure being 200 lbs. per sq. in., and the tractive effort at 85 per cent. of the boiler pressure is 21,486 lbs. The grate area is 17.5 sq. ft., and the total heating surface is 979 sq. ft. Ross "Pop" safety valves are fitted, and on the right hand or fireman's side of the engine there is an exhaust steam injector of the latest type.

The weight of the locomotive in working order is nearly 71 tons, of which more than 44 tons are available for adhesive purposes. The water capacity of the tank is 1,500 gallons and 3 tons of coal are carried.

Where possible standard locomotive fittings have been employed in the construction of these locomotives in order to facilitate repairs and renewals. Mechanical lubrication is provided for cylinders, piston rods, piston valves and spindles, and a second mechanical lubricator supplies oil to the coupled axle boxes. A steam brake is provided on the coupled wheels and on the trailing bissel truck, and vacuum automatic brake fittings and train heating apparatus are fitted.

The cab is roomy, and easy access is given to all controls.



Courtesy] [*L.M.S.*

The first to be completed of a series of 2-6-2 Passenger Tank Locomotives built at the Derby Works of the L.M.S. They are to be used for suburban working.

Colour-Light Signalling

Automatic signalling is to be installed on the L.M.S. line between Euston and Watford. This will include the use of three-aspect-colour-light signals, of which 201 will be provided. The adoption of this system of signalling will enable a greatly increased service of trains to be run.

For the colour-light signalling between Paddington and Southall on the G.W.R., 400 light signals will be required.

The L.N.E.R. are contemplating the installation of colour-light signals at King's Cross Station. This would enlarge the capacity of the running lines and also eliminate one of the two signal boxes.

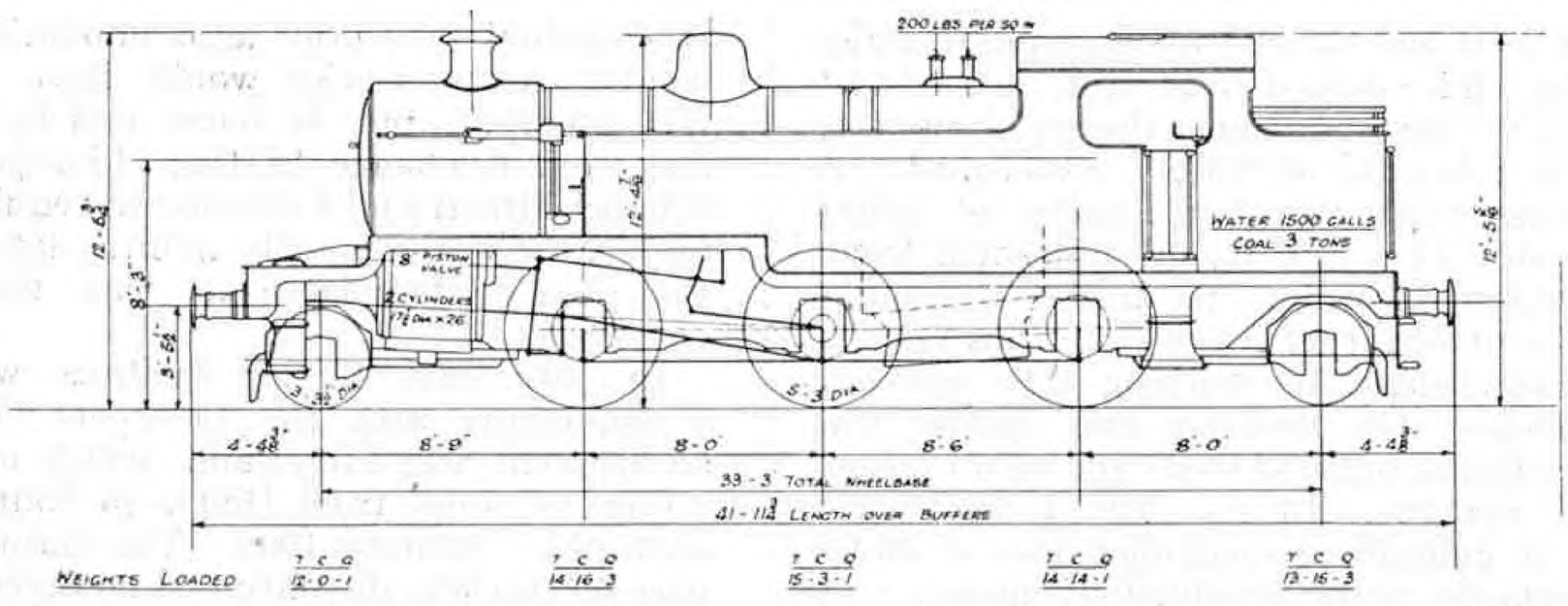
Progress on the Metropolitan Railway

It is twenty-five years since the Metropolitan Railway abandoned steam locomotion for electric traction. The change revolutionised underground travel and since it was made many changes have been brought about and many improvements effected.

The most remarkable of the changes has been the intensification of the service. To-day nearly a million train journeys are made in a year. The number of trains handled at Baker Street alone is upwards of 1,500, and during a single "rush" hour the number of cars passing in and out of this busy centre totals no fewer than 637.

Locust Plague and Railways

Swarms of locusts have been causing trouble on railways in the East. At some places on the railway line in Palestine the swarm was three feet in depth.



Courtesy] [*L.M.S.*

Dimensioned diagram of the new L.M.S. 2-6-2 Passenger Tank Engine.

High-Pressure Locomotives

An experimental three-cylinder compound locomotive working at an ultra high-pressure has been built for the German Railways. It is of the 4–6–2 type, with driving wheels 6 ft. 6¾ in. in diameter and is designed for express passenger service. It has a special type of double-pressure boiler on the Schwartzkopff Löffler system. There are two high-pressure cylinders, 8.66 in. diameter by 26 in. stroke, to which steam is fed at a pressure of from 1,420 to 1,700 lb. per sq. in. From these cylinders the exhaust steam passes at a pressure of 256 lb. per sq. in. to the low-pressure boiler, or heat exchanger as it is alternatively called, and finally at a pressure of 213 lb. per sq. in. it goes to the low-pressure cylinder, which measures 23.62 by 26 in. The weight in working order of the engine alone is 113 tons.

Neither of the British high-pressure locomotives has so far been put into regular service. The L.N.E.R. engine, No. 10000, is still stationed at Darlington from where numerous experimental trips have been run. This "Hush Hush" engine has been as far south as King's Cross, London, and as far north as Perth, and everywhere its appearance has excited the keenest interest.

Since the unfortunate accident in February last, when a tube burst in the fire-box, the L.M.S. engine "*Fury*" has been at the makers' works at Glasgow.

L.M.S.R. Notes

Mixed traffic 2–6–0 engines are being turned out steadily from the works at Crewe and a further ten, numbered 13160–9, have been put into traffic. It is understood that they are to work on the L. & Y. section of the Central Division.

Engine No. 5979, a 4–6–0 of the "Claugton" class that for a while ran with boiler fittings and cab altered to fit the Northern gauge, has now been fitted with a standard boiler but has a cab adapted to the Midland gauge. Engines Nos. 5642 and 5758 "Prince of Wales" class, and No. 5502, "Experiment" class, in addition to No. 5365, "George V" class and Nos. 9152 and 9322 G1 mineral engines, have also been altered to conform to the Midland gauge.

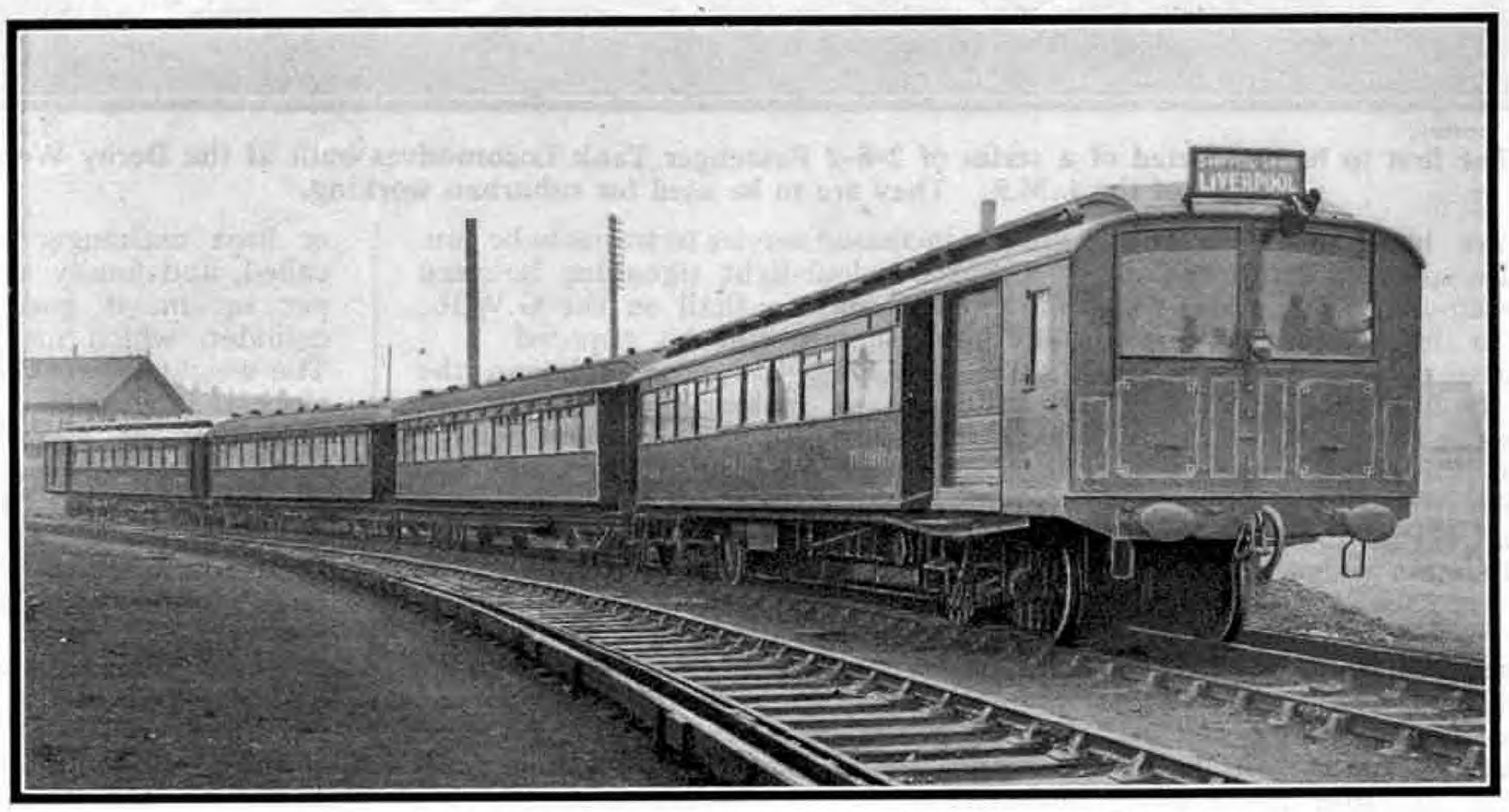
Another engine of the "Renown" class—No. 5185 "*King Edward VII*"—has been withdrawn from service.

The Three Electric Railways of Liverpool

III.—The Liverpool, Southport and Ormskirk Line

THE longest and most important of Liverpool's three electric railways is the Liverpool-Southport line, with its extension from Southport to Crossens, and a loop line between the Marsh Lane and Aintree junctions. This railway differs from the two Liverpool electric railways already considered in that it is a normal surface line, originally operated by steam locomotives and subsequently electrified.

The electrification of this line, and also that of the Mersey Railway, the North Eastern Tyneside lines, and the Great Western and Metropolitan Joint Railway, all took place in a period of about five years, during which electrical operation came rapidly into favour as the result of the opening of the Central London Railway in 1900 and the conversion in 1904-5 of the Metropolitan and District Railway. During this period also the advantages of the multiple unit system as against the use of separate electric locomotives became definitely established. A multiple unit train made up of a number of motor and trailer cars may be added to, or subtracted from, quickly and easily, according to traffic demands; and also it may be driven from either end, thus making it particularly convenient for working into and out of terminal stations. The multiple unit system was first seriously developed some 32 years ago by a Chicago engineer named Sprague. In its earliest form each motor car had a cylindrical controller placed under the floor, the cylinder being revolved by means of a pilot motor controlled by a small commutator on the driver's platform. As trains became heavier and more powerful motors had to be fitted, it was found that this type of controller was inadequate, and a group system of switches was devised by means of which the motors were started and regulated.



A typical electric train on the Liverpool-Southport Railway.

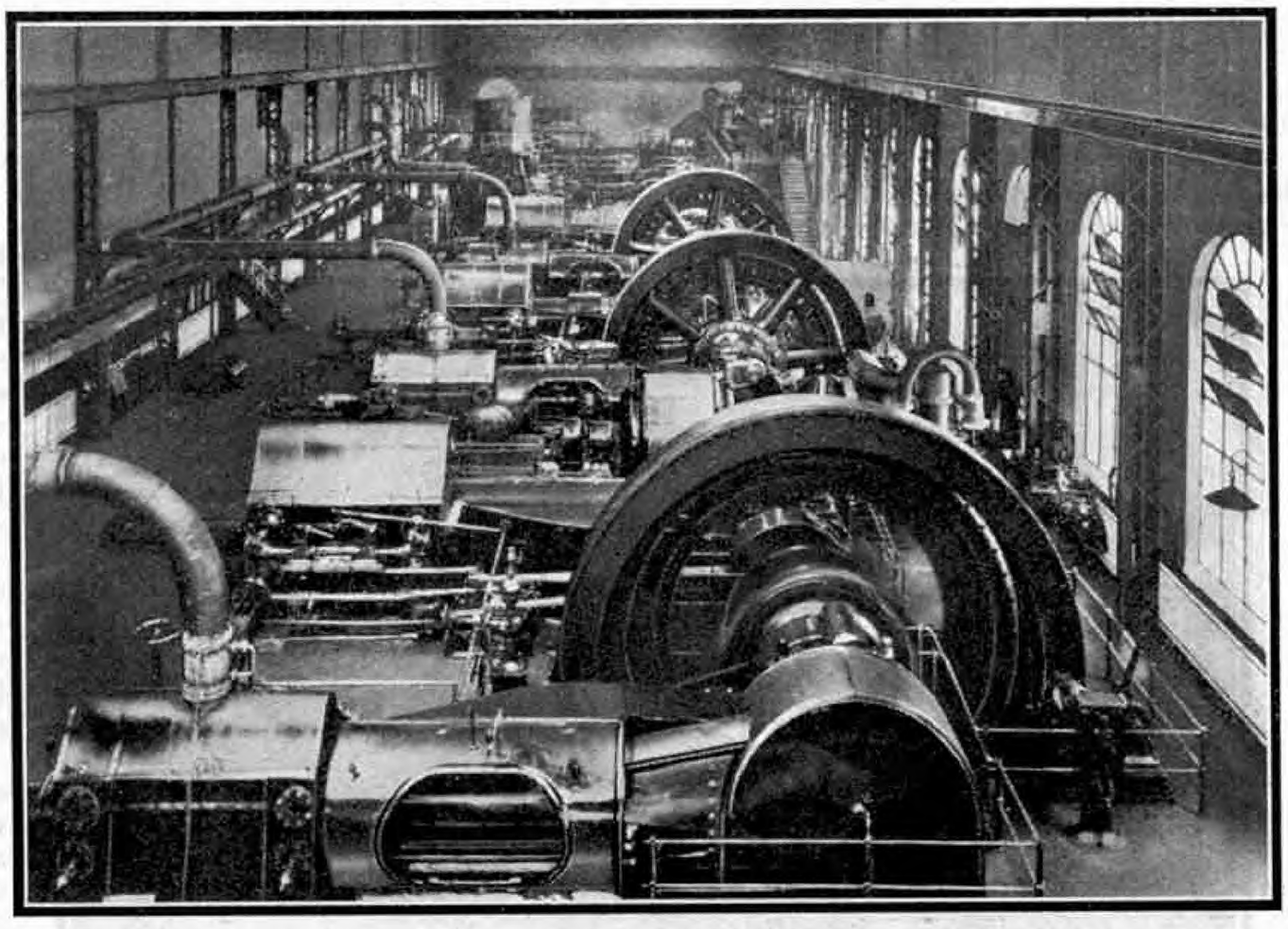
The Liverpool, Southport and Ormskirk line consists of two sections, of which the longer is that between Liverpool and Southport, which serves the prosperous and growing townships along the coast of Liverpool Bay. The Liverpool-Ormskirk section is largely used by residential traffic, the goods traffic being handled by steam trains. Ormskirk is an interesting town apart from its importance as the principal centre of the fertile South Lancashire agricultural belt. To the younger generation at least, it is famous also as being the home of that old-fashioned commodity, gingerbread. The town was established before the reign of Richard II, and possesses a church that has the distinction of having both a steeple and a tower!

All the towns and villages on this line are popular residential districts for the business men whose daily work takes them into Liverpool. The Southport line proved unexpectedly profitable, and the necessity soon arose of improving the service. In 1903 the Lancashire and Yorkshire Railway, which then owned the line, decided upon electrification, realising that by this means increased facilities could be provided without the costly additions to terminal platform accommodation that an augmented steam service would have involved. Work was promptly put in hand, and by March 1904, the line from Exchange Station, Liverpool, to Southport (Chapel Street) and Crossens was equipped and opened for electric working. Six months later the full service that was contemplated at that time was put into operation.

In July 1905, further facilities were provided by a connection with the Liverpool Overhead Railway at Seaforth and Litherland, which enabled a through service of trains from Dingle to Southport to be commenced in January 1906. The through Dingle-Southport service was discontinued however at the beginning of the War, and has not been resumed. During Grand National week occasional Liverpool Overhead trains are run between stations on that company's line and Aintree. The Liverpool-Aintree electrified section was opened in 1906 and that to Ormskirk in 1913. The Ormskirk line receives its biggest test on Grand National Day when, between 11.15 a.m. and 2 p.m., many thousands of people leave the Exchange Station at Liverpool for Aintree, train after train going out in rapid succession, each packed to its utmost capacity.

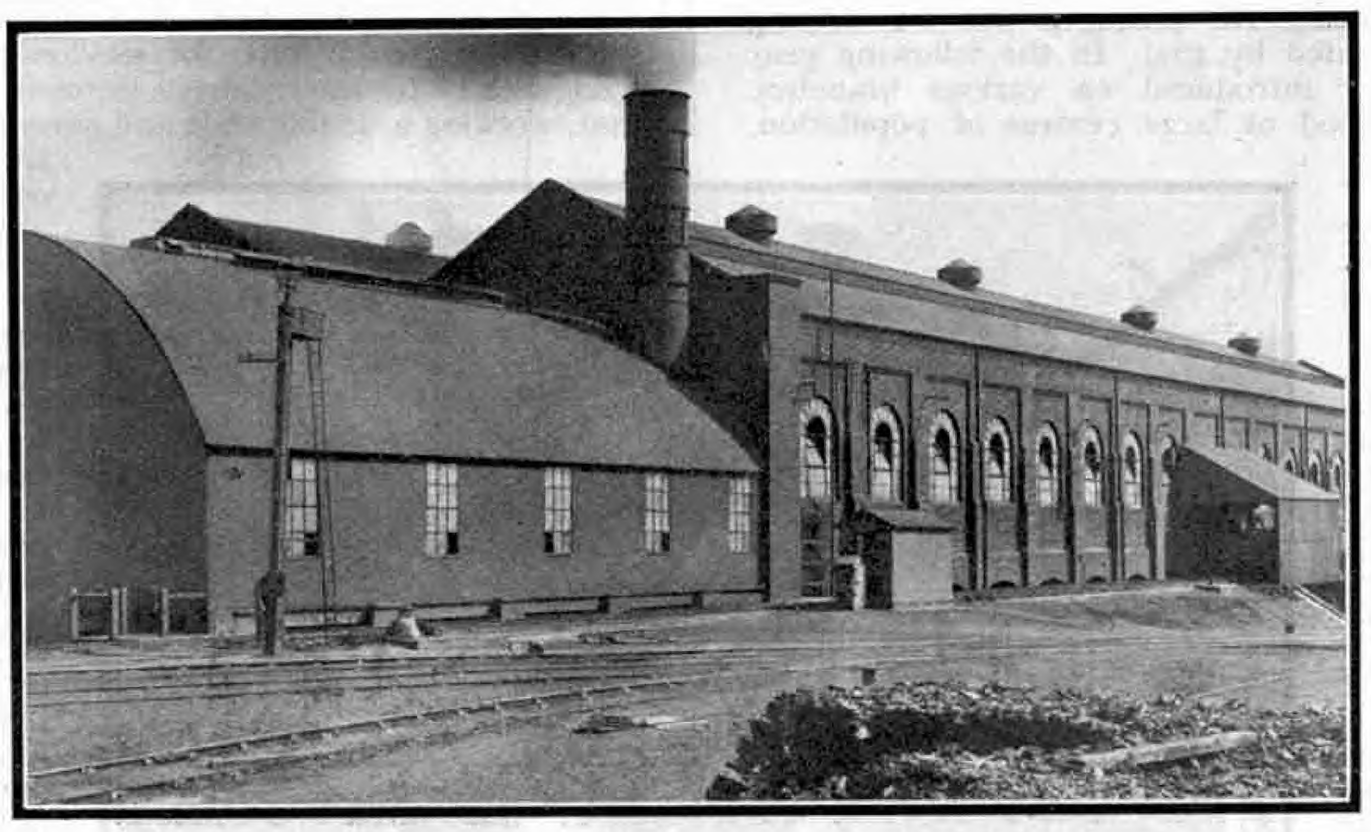
The total electrified mileage of the system is now equivalent to 94 single track miles. The line is of standard gauge, 4 ft. 8½ in., and the steepest gradient is 1 in 85.

The advantages arising from electrification were very quickly evident, among them being the higher average journey speed, the more frequent service, and the increased acceleration when leaving stations. Another and important advantage was pointed out at the time by Mr. John A. F. Aspinall, then General Manager of the Lancashire and Yorkshire Railway :— "Every time a locomotive train comes in and goes out you have four platform operations and eight signal operations. First of all the train comes in, then a locomotive follows it, that is two ; then the train goes out, that is three ; then the locomotive which brought it in goes out, that is four platform operations, which means eight signal operations. The electric motor train comes in, that is one ; the motorman goes to the other end of the train, and the train goes out, that is two. You have only two platform operations, and four signal operations. The result is that, by using motor car trains instead of locomotives, you double the capacity of your terminal accommodation."



Part of the generating machinery at the Formby power station, which provides current for the whole of the Liverpool, Southport and Ormskirk line.

The power station to supply the electric current for operating these lines is situated at Formby, which is about midway between Liverpool and Southport. As a result of the extension of electrified track and the improvement in the train services, it has been necessary to reconstruct the power station and to make considerable additions to its plant. To-day the generating machinery consists of seven turbo-alternator sets, three 6,500 K.W., one 3,750 K.W., one 2,000 K.W., and two 250 K.W. The two last mentioned sets are used for auxiliary supplies, such as for power station lighting, excitation current for the main generators, etc. There are five Clayton and Shuttleworth water-tube boilers, each capable of evaporating 32,000 lb. of water per hour, and complete with superheaters and economisers. An evaporator and de-aerator is installed for the supply of water to the boilers. Automatic coal and suction ash plant is installed. The necessary water is supplied by the river Alt, a small stream that passes near the power station.



Exterior view of a section of the Formby power station.

At the power station current is generated at 7,500 volts A.C. and distributed to six sub-stations, one of which also has a battery, where it is converted to 600 volts D.C. and fed to the conductor rails. There are at present two battery-equipped sub-stations in addition to the one just mentioned, but these take current from the conductor rails during slack train periods and return it to the rails to assist working during periods of heavy traffic. The track is equipped with a positive conductor rail and the running rails are used for returning current to the sub-station. A fourth rail is provided, and this is bonded to the running rail to assist the return of current, no contact being made between this fourth negative rail and the train. The current collector shoes on the train pick up current from the positive rail and return it through the wheels and running rails. At the present time there are both 70 lb. per yd. and 105 lb. per yd. conductor rails used, but eventually, when relaying is completed, only the 105 lb. rail will be in use.

The rolling stock originally consisted of 38 motor cars, 12 multiple unit motor cars, and 48 trailer cars. These were made up into two-car units, and operated as such during the slack hours, being made into four or five coach trains during rush periods. This stock replaced the 30 steam engines and 152 coaches required for the operation of the line before the change. Since the commencement of electric working the rolling stock has been considerably increased, and it now consists of a variety of types owing to additional cars having been introduced from time to time to meet the growing traffic requirements. The most recent addition consisted of 11 three-car trains of the compartment multiple unit type, which permit of a very rapid rate of loading and unloading, a very important feature during the rush hour periods of the day. So far as is known at the moment, this is the type of rolling stock that will be used in the future.

Light Power Units for Railways

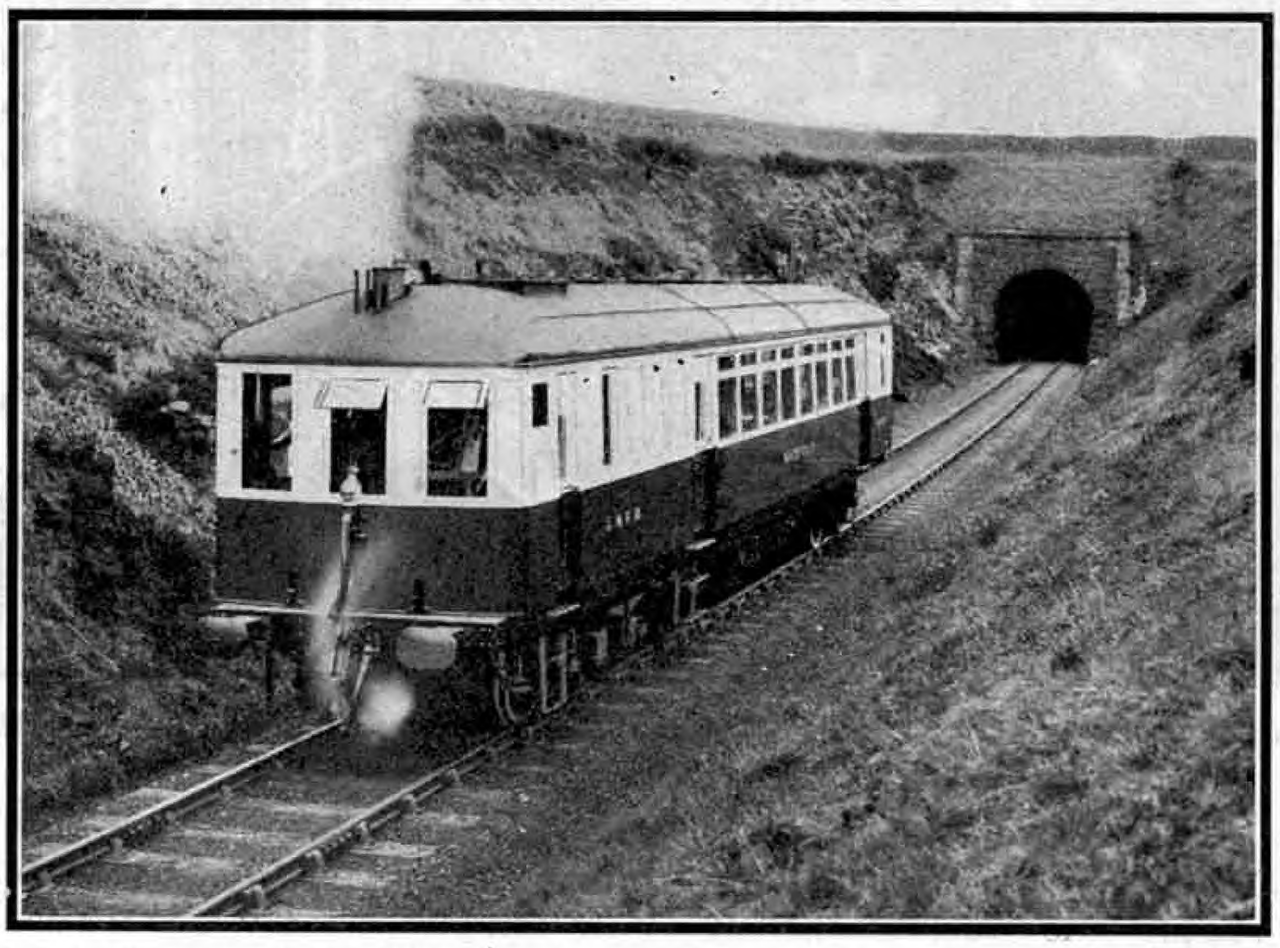
Development of the Steam Coach

ONE of the most interesting features of railway operation during the past few years has been the increasing use by the railway companies of the steam rail coach. The motor omnibus had begun to cut deeply into railway passenger receipts, and it was necessary for the railways to make a serious attempt, particularly on branch lines and in thinly-populated districts to win back some at least of the traffic that had been lost to them. The road vehicle possessed certain advantages over the train, prominent among which were its capacity for varying its route at will and its ability to pick up or set down passengers at any required point along the route. The railways on the other hand had the very important advantages of speed and comfort, and the problem with which the companies were faced was that of competing with their rivals in frequency and convenience of service at the lowest possible running cost.

In 1902 the London and South Western Railway introduced a steam rail coach built at Nine Elms. This vehicle seated 10 first-class and 32 third-class passengers, and was capable of a speed of 30 m.p.h., which could be attained within half a minute of starting. It was provided with arrangements for driving from either end and was lighted by gas. In the following year the Great Western Railway introduced on various branches, and also in the neighbourhood of large centres of population, rail motor cars that performed circular trips or "shuttle" services. A policy of providing "halts" on or near the highway, at which passengers could alight or embark, was instituted, and this has been developed extensively throughout the system. Auto-trains consisting of two coaches with a small tank engine in between, or of one coach hauled by a tank engine, were also introduced and have been found of great service in many districts. Trailers are attached to these units as required.

Some of the companies that are now merged in one or other of the great groups formerly used rail motor coaches to some extent. In most cases this method of working was discontinued, however, probably because it was found that the power unit then in use showed little economy as compared with the local steam trains. Some five or six years ago, however, makers of steam road motor vehicles turned their attention to the steam rail coach. The first experiments gave remarkably promising results, and since that time rapid technical progress has been made. The best known of these new vehicles are the Sentinel-Cammell cars, built by the Sentinel Waggon Works Ltd., and Cammell Laird and Co. Ltd., and those built by Clayton Wagons Ltd.

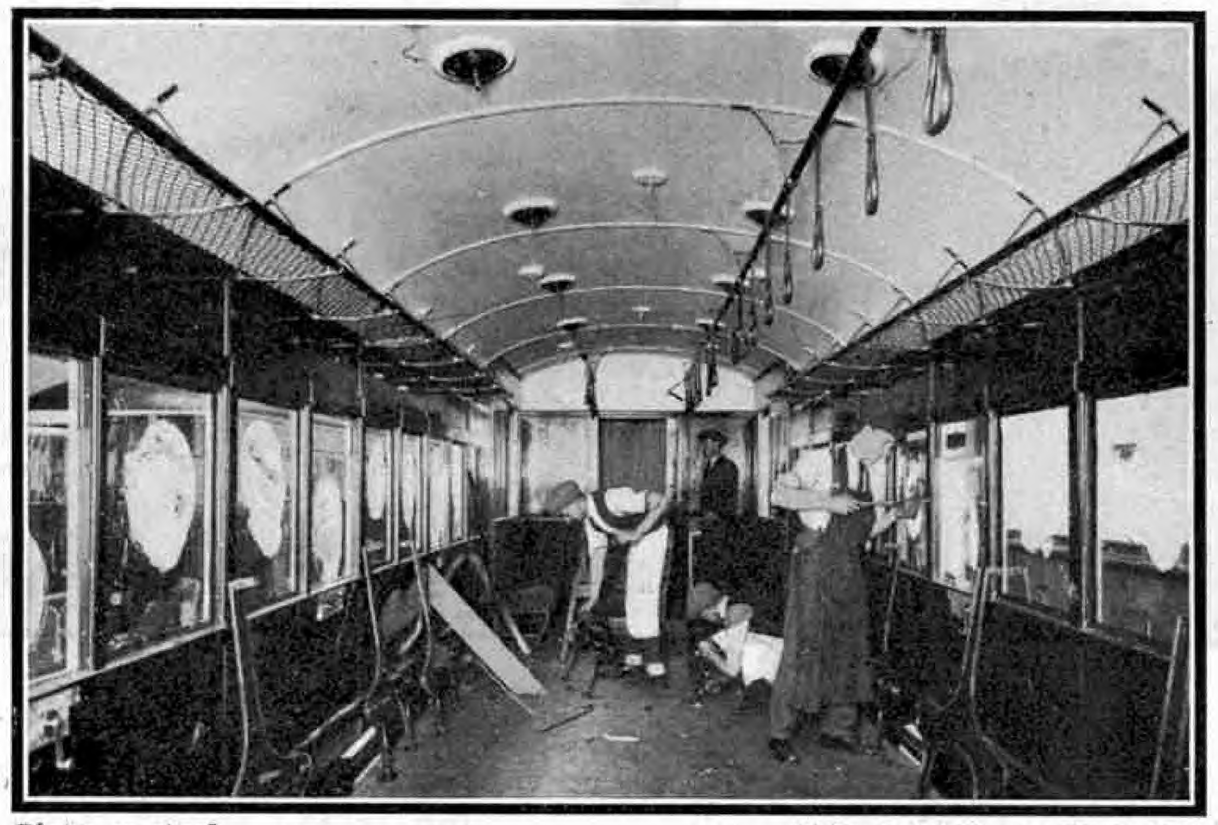
Among the first companies to experiment with steam rail coaches of this type was the L.N.E.R., which made some experimental runs from Pickering to Whitby, and thence to Scarborough by the coast line, in 1924. This test was a severe one from a gradient point of view and valuable experience was gained. Orders were placed for two vehicles, which were placed in service for East Anglia. Subsequent tests were made with a development of the Sentinel type and in 1927 two more cars were introduced in the Newcastle area, and later a Clayton car was employed.



Sentinel-Cammell geared steam rail coach "*Nettle*," running on the L.N.E.R.

At the beginning of 1928 a new design of Sentinel was introduced, this being a gear-driven, two-cylinder double bogie coach; and it was followed by the six-cylinder gear-driven Sentinel. Last year a considerable extension in the use of rail coaches took place, particularly on the north-east coast. Both Sentinel-Cammells and Claytons are employed, and the results in the case of both types have been perfectly satisfactory.

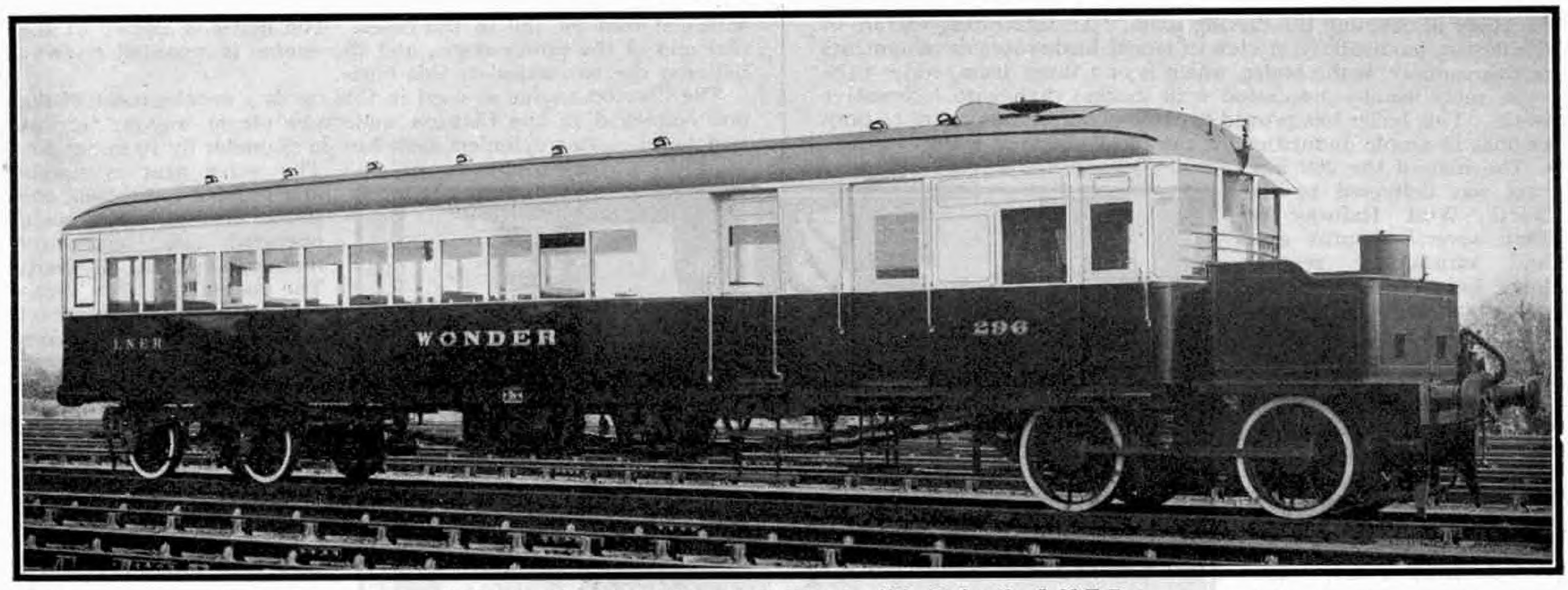
Steam rail coaches have their limitations, but they carry out successfully certain types of services that cannot be performed economically by the ordinary locomotive and train. It is stated that, working a double shift and covering some 200 miles per day, the cost per mile of a steam coach is about half that of the ordinary steam train. This economy enables services to be maintained in difficult areas, and it has happened that new services operated by rail coaches have proved so popular that a normal train service had to be set up to meet the needs of the traffic thus cultivated. Again owing to the low running costs, it has been found possible on some branch lines to double or even treble the existing services with very little increase in expense. The reduction in working costs that has been brought about by the use of the rail coach has a special value where train services are being run at a loss but must be continued; and where it is desired to give additional services although the traffic does not justify the running of extra steam trains.



Photos courtesy] ["*Sentinel*" *Waggon Works Ltd.*

Fitting seats and blinds in Sentinel-Cammell coach.

An interesting feature of the adoption of rail coaches on the L.N.E.R. is that these have been given names borne by famous road coaches in the stage coach era: among them being "*Rapid*," "*Comet*," "*Chevy Chase*," "*Transit*," and "*Bang-up*." A march thus seems to have been stolen on the road interests which, one



" Clayton " steam rail coach " *Wonder*," built for the L.N.E.R.

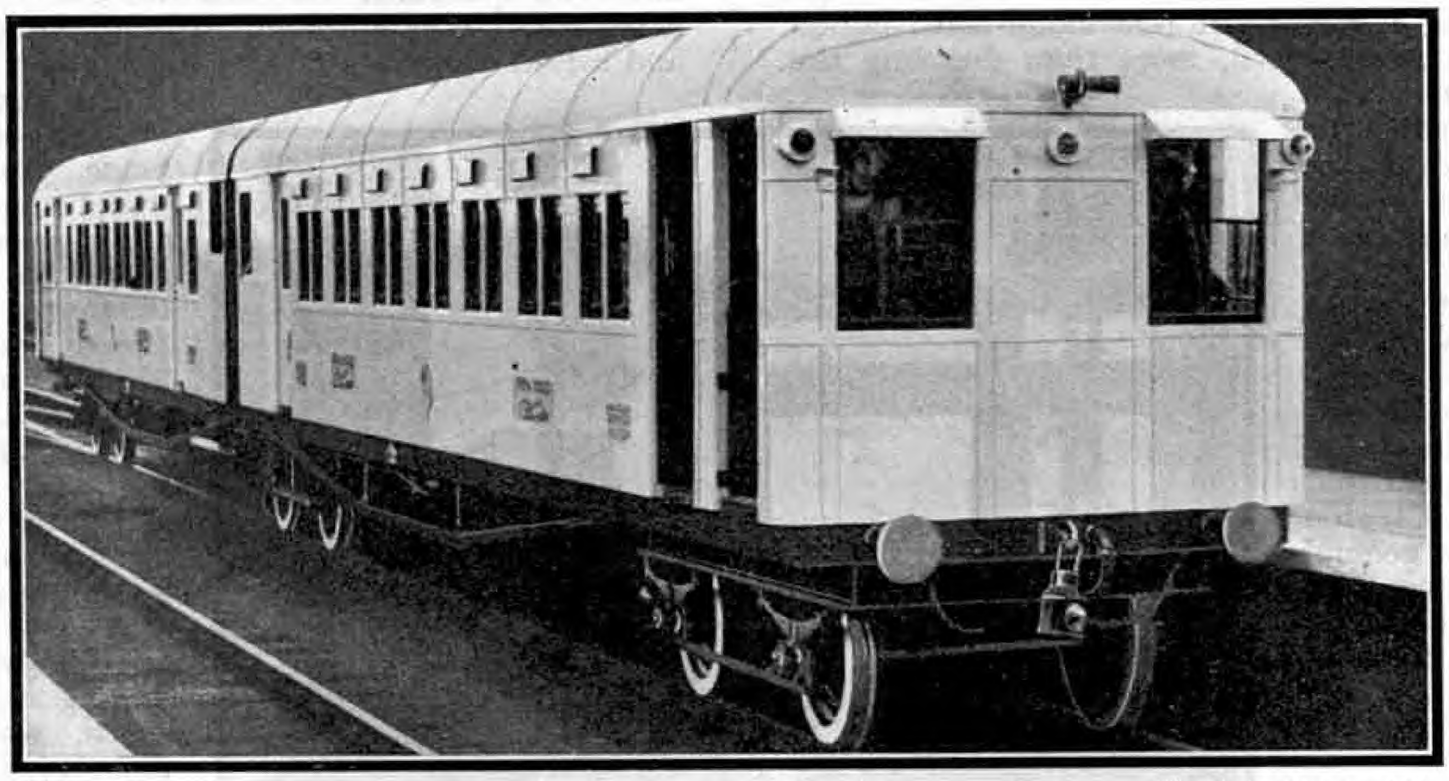
cannot help thinking, should have appropriated these titles for their own vehicles, as these are the direct and real successors of the stage coach.

The Sentinel-Cammell and the Clayton coaches differ considerably in design and construction and therefore it will be of interest to describe a typical example of each.

The standard Sentinel-Cammell gear-driven rail car has a six-cylinder single-acting engine with cylinders of 6 in. bore by 7 in. stroke, and the engine is suspended underneath the coach body behind the leading bogie. The designed output is about 130 b.h.p. at 500 r.p.m. Poppet type valves are used, actuated by cams; and lubrication to all surfaces is effected under pressure. Three running positions, corresponding to early, intermediate and late cut-off, are provided for in each direction of rotation, with in addition a central position in which all valves are held open. If adjustment becomes necessary, easy access to the engine is provided by means of removable floor boards in the luggage compartment, and the engine itself can be completely removed from the frame in about an hour. The cylinders, with the inlet and exhaust valve assemblies, are in clear view on one side of the coach. There are no flexible steam pipes or controls, the engine and the boiler both being firmly attached to the coach framework. Power is transmitted by universal joints splined on a cardan shaft from the engine to the gearbox, which is arranged on the front axle of the driving bogie. Any relative movement between the bogie axle and the engine is completely taken up by the universal joints and splines, no motion being transmitted to the engine itself.

The gear-box casing is carried on the axle by two bearings loaded to 150 lb. per sq. in., and flooded with oil thrown on to them by the gears. It incorporates a pair of bevel gears carried on roller bearings, and a pair of nickel chrome steel spur gears. Torque is dealt with by a stay bolted to the box and links suspended above the bogie frame. The boiler is of the latest Sentinel vertical water-tube type, and is designed for a working pressure of 300 lb. per sq. in. It has an output of about 2,350 lb. of steam per hour with Welsh coal. A cool driving compartment has been secured by adequate lagging of all heated parts, together with the provision of air casings over the boiler top and round the base of the funnel. Steam is taken through a superheater coil to the main valve, the total superheat temperature being from 650° to 700°F. The boiler is fed by a two-ram engine pump and two injectors are also provided. The boiler is so arranged that the whole of the firebox with the water tubes can be lowered out of the boiler for cleaning or repair. The wash-out plugs and the mechanism for dropping the hinged ashpan and half firegrate are readily accessible from the front of the car.

The bunker is completely enclosed in the body of the car and is designed to carry 30 cwt. of coal, sufficient for a run of about 300 miles. The coal is filled through flap doors in the roof. A 450-gallon water tank is arranged transversely at the back of the cab and can be filled from either side of the car. The water supply is sufficient for a run of about 60 miles. The driving compartment is roomy and comfortable, and the control levers are brought to a column in front of the driver's seat. An unobstructed view of the track ahead is provided by large glass windows, which are fitted with a mechanical wiper operated by suction.



Photos courtesy] [*Clayton Wagons Ltd.*

" Clayton " articulated steam coach, built for the Egyptian State Railways.

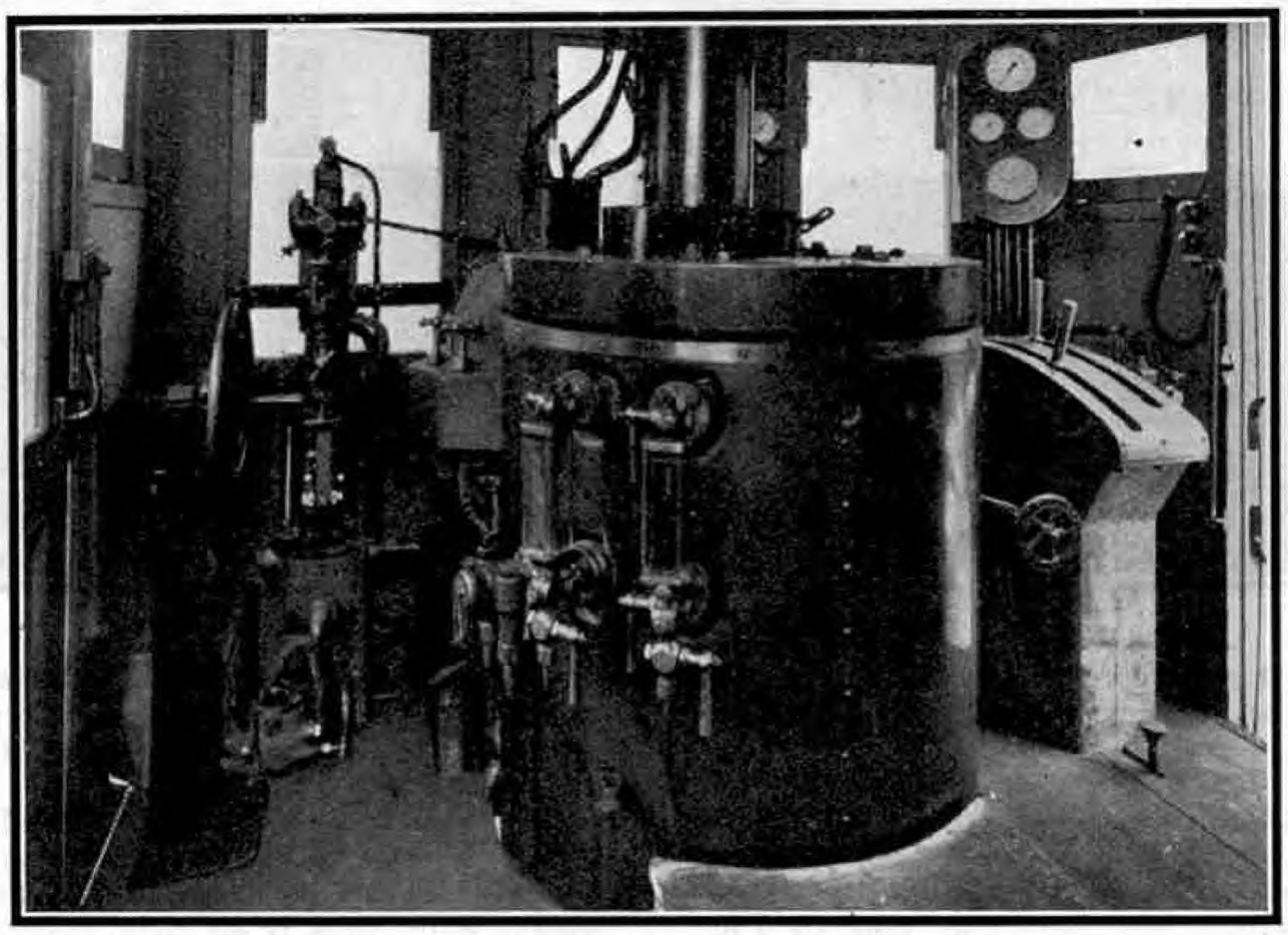
The coach body is divided into a third-class compartment to accommodate 59 passengers on reversible seats, a driver's cab at each end, and a luggage compartment next to the engine cab. Straps are provided for 20 standing passengers and there are parcel racks along the whole length of the compartment. Sliding doors give access from the luggage compartment to the driver's cab and the passenger compartment; and two large sliding doors are fitted at each side of the coach, those at the front end giving access to the luggage compartment. Steps are provided to allow of the car being entered from ground level. The car is steam heated and well ventilated, and lighted by a dynamo driven from the forward axle of the trailing bogie. A noteworthy feature is that the solebars of the underframe run from end to end of the car and the boiler and the engine are rigidly attached to them. This is a departure from the previous practice of articulating between the passenger accommodation and the power unit. The design of the bogies follows standard railway practice, and the upper parts of the car are painted cream and the lower portion bright green.

The length of the vehicle over buffers is 62 ft. 8 in., and the length over the body 58 ft. 6 in. The overall width of the car is 9 ft., and the height from rail to the top of the roof 12 ft. 4¼ in. The weight of the car in running order is 31 tons 15 cwt., and the car will maintain a speed of 50 m.p.h.

The latest Sentinel-Cammell development is a 200 h.p. rail car fitted with two engines each similar to the engine of the car just described. The second engine is placed in front of the rear bogie and drives the back axle of the car. The use of the two engines has the effect of distributing the weight and dispensing with the

necessity of coupling the driving axles. An interesting feature of the design, particularly in view of recent locomotive developments in this country, is the boiler, which is of a three-drum, water-tube type, more usually associated with marine than with locomotive work. This boiler has proved capable of supplying steam to both engines in ample quantities for the most exacting work.

The first of the 200 h.p. cars was delivered to the North West Railway of Peru several months ago, and satisfactory reports have been received of its performance in that country. This car, however, was arranged for oil firing with a large boiler of the vertical type. In January of this year the first standard coal-fired car with the new boiler passed successfully through a severe test on the London and North Eastern Railway, for which company it was constructed. The route chosen for the test was from York to Whitby, and from there back by Scarborough, which includes the famous Ravenscar gradient of 1 in 39 for a distance of about three miles. A horsebox was attached in the rear over this part of the journey, and with this load the car covered the 3¼ miles between Flying Hall and Ravenscar in 12¼ minutes, as compared with the ordinary passenger timing of 13½ minutes. On the level a speed of 60 m.p.h. was obtained without vibration or undue sway, the riding throughout the trip being smooth and easy.



The forward driving compartment of the Sentinel-Cammell rail car, showing boiler, controls, feed-heaters, injectors, etc.

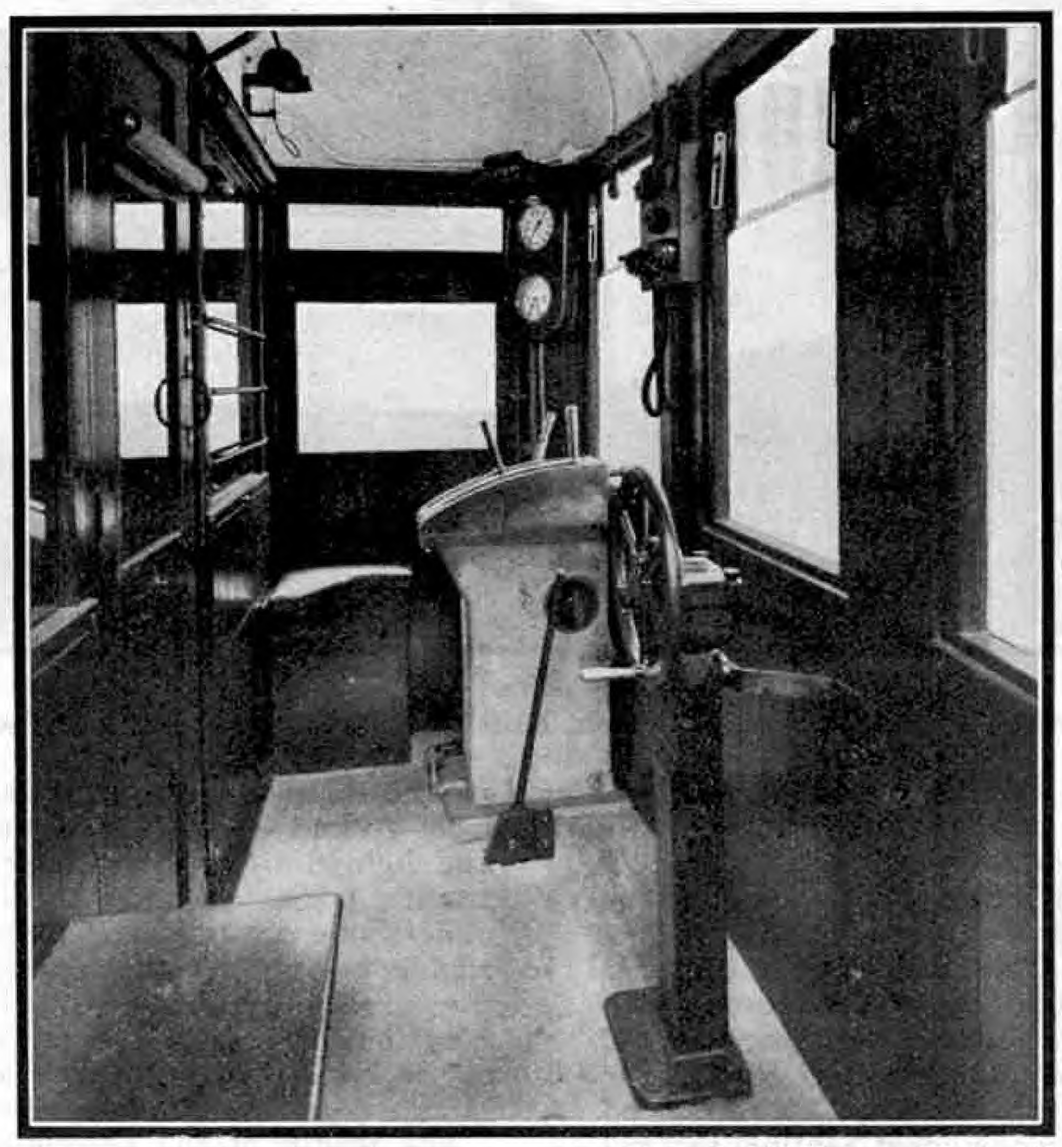
Other similar cars for the L.N.E.R. are now under construction in which a trailer car is incorporated, more than doubling the passenger-carrying capacity. This trailer is articulated with the driving car, the rear end of the latter and the front end of the trailer being carried on one bogie on the "Gresley" patent system.

The standard Clayton steam rail coach differs considerably in appearance from the Sentinel-Cammell coach, as is shown in the accompanying photographs. The difference is mainly due to the fact that while the engine of the Clayton coach is enclosed in the general body of the vehicle, the water tank and the coal bunker are detached from the main body and form an extension to the coach although they are mounted on the engine bogie.

The vehicle is of all-steel construction. The body and the underframe form one unit, and the former assists the latter in withstanding stresses. The body is mounted at each end on a swinging bolster disposed midway between the axles. Double-coil helical springs are fitted in the bolsters, and laminated springs are provided at each axle box. The suspension system is therefore identical with that of modern bogie carriage stock, and gives equal smoothness and comfort in running. The complete power equipment is mounted on one bogie, which is readily removable for overhaul. The water tank and the coal bunker are carried on the forward end of the power bogie, and are clear of the body; this permits standard coaling and water appliances to be used, and an ample supply of fuel and water to be carried. Provision is usually made for the carriage of 550 gallons of water and 15 cwt. of coal; that is, sufficient water for a run of from 100 to 120 miles and sufficient coal for 150 to 180 miles. The boiler is carried at the rear end of the power bogie, and the engine is mounted midway between the two axles on this bogie.

The Clayton engine as used in this car is a development of the one employed in the Clayton undertype steam wagon. It has two double-acting cylinders each 7 in. in diameter by 10 in. stroke. The valve gear is simple and quiet in operation, the piston valves used being operated by eccentrics mounted on a layshaft. The eccentrics run continually in the crankcase oil bath, and are therefore perfectly lubricated. A simple device is used to control the angle of advance and throw of the eccentrics, and to effect reversing. The engine is fully enclosed.

The boiler is of the vertical cylindrical type with cross water tubes and superheating coil. The tubes are inclined at about 12 degrees from the horizontal, so that the hot gases cross the tubes almost at right-angles, which is the condition for maximum heat transfer and for rapid circulation. The working pressure is 300 lb. per sq. in., and with good quality coal the boiler easily evaporates 2,400 lb. of water per hour. The boiler is fired from the front, and not from the top as in the original "Clayton" boiler. The firebox, complete with tubes, can be dropped for examination or cleaning. The joint faces are machined and asbestos gaskets are used. The boiler is fed from an independent steam-driven pump or by an injector; and a feed-water heater utilising exhaust steam is provided.



Photos courtesy] [*"Sentinel" Waggon Works Ltd.*

Rear driving compartment, showing controls.

The engine is mounted on two bearings on the forward axle of the bogie, and drives a heavy spur wheel mounted on this axle through a pinion on the crankshaft. These gears are machine cut and oil-toughened; they are totally enclosed and run in an oil bath. The two axles of the engine bogie are coupled by side rods.

The bogies have a wheelbase of 7 ft., and are spaced 42 ft. 6 in. apart between the centres; although these dimensions may be varied to suit the special requirements of any particular railway. One bogie carries the complete driving unit and that end of the coach, while the other supports the opposite end of the coach body. The driver's cab is roomy and comfortable, and the windows provide a full view ahead. Covers are fitted to the coal bunker in order to prevent dust from being blown against the driver's windows. The controls are duplicated at each end of the body so that the driver can run the coach from either end as may be required.

The car has seating accommodation for 60 or more passengers; or if "bucket" seats are used, from 44 to 50 passengers can be accommodated. A good-sized luggage compartment is provided at the front end, and at the opposite end there is a driver's compartment for use when the car is running in the reverse direction. Suitable steps are furnished to enable passengers to mount or alight from ground level where it is not convenient for a stop to be made at a station. This standard type of coach is primarily intended to run as an independent unit, but it is always equipped with standard buffing and drawgear so that it may be run

(*Continued on page 462*

The Train Ferries of Denmark

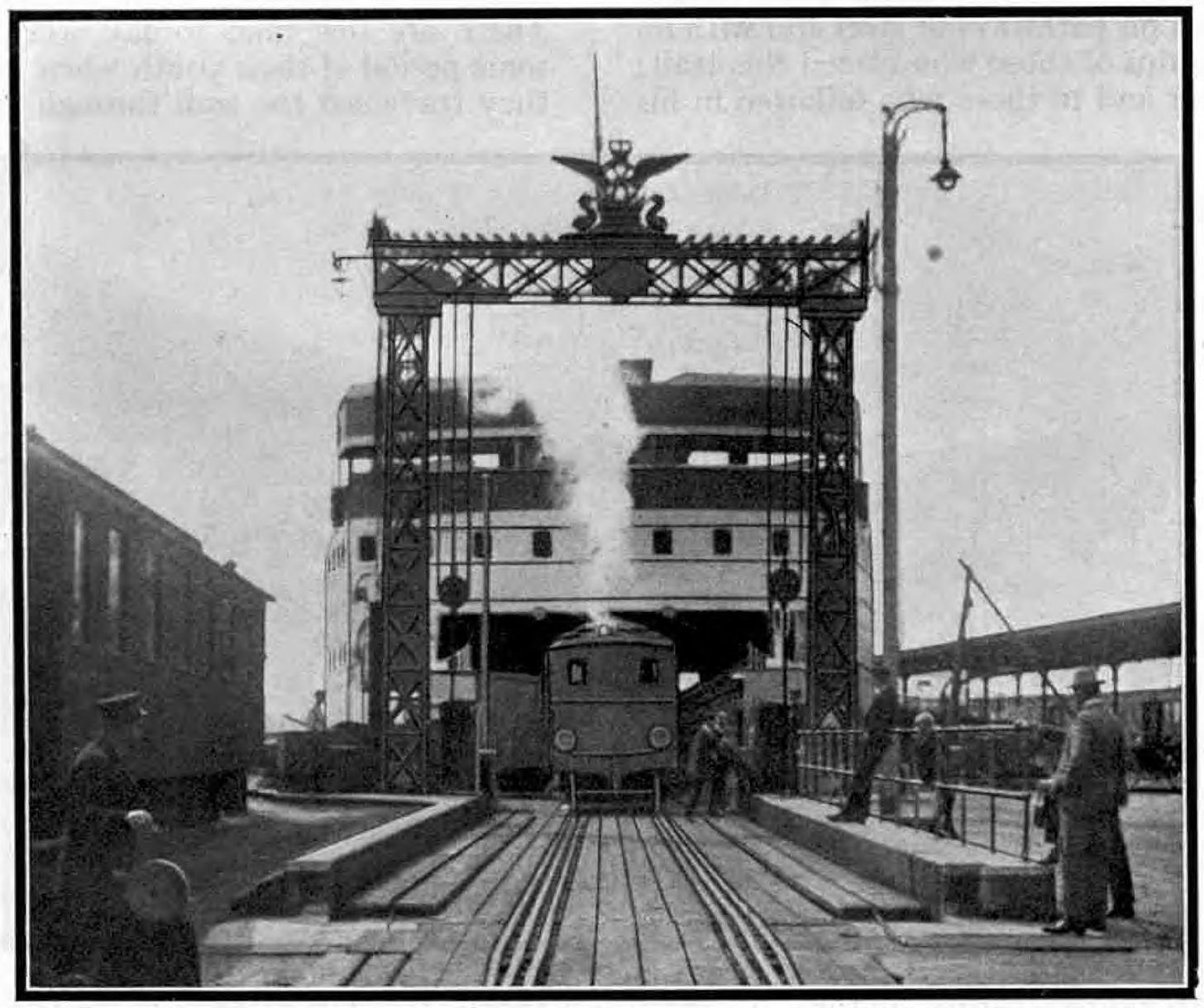
By J. R. Hind

PROBABLY no other country in the world has such a long and varied experience of train ferry services as Denmark. The very nature of the country—divided as it is into three main portions, Jylland or Jutland, the mainland; Fya or Funen; and Zealand or Sjælland, by the Little Belt, the Great Belt, and Oresund—demands the assistance of seagoing vessels in order to establish through railway connection.

The railways of Denmark are State-owned, as are the connecting ferries; and since 1872 ferry steamers, capable of carrying railway wagons, trucks and carriages across the seas, have been in service between various points. The earliest of these train ferries operated across the waters of the Little Belt. It consisted of two single-deck paddle steamers, with one track of metals, a speed of eight knots, and accommodation for 300 passengers on each side of the railway vehicles.

The Danish Railway ferry and steamer fleet now consists of six ships, 24 train ferries and four ice-breakers, out of which 20 are in commission daily.

On the main passenger routes the Fredericia—Middelfart, Nyborg—Korsor, Copenhagen—Malmo, and Gjedser—Warnemunde ferries are perhaps the most important, and a short description of these vessels will therefore be of interest.



A train passing from the quay on to one of the large train ferries of the Danish State Railway. The photograph shows the passenger decks that form a bridge over the track deck of the vessel. In the foreground is the massive bridge with lifting tackle at each side, for raising the gangway.

The Fredericia—Middelfart services are maintained by a fleet of five small single-deck one-track ferries, to which connecting gates, which are standard throughout the country, give access at all states of the tide. Passengers by special carriages on through trains, and sleeping car travellers, are taken aboard by 0–6–0 tank engines with long chimneys, small boilers and outside cylinders; the remainder of the passengers walk aboard by covered ways. The shunting is a slow and careful process, small steps being placed to enable train passengers to alight on deck. On arrival at Middelfart the train ferry is turned in order to berth, although the vessel is capable of forming rail connections at either end. The bridge is lowered into position, and a tank engine takes away the carriages and vans to be attached to the waiting train. A block of wood serves as a safety stop between the tank locomotive and the connecting bridge until it is actually in position. The journey across the Little Belt takes from 30 to 40 minutes.

Between Nyborg and Korsor much larger vessels are employed, six train ferries with double tracks and two with three tracks being in service. On these boats, which are the latest types, passenger decks form a bridge entirely over the track deck, and the double oval-shaped funnels, painted black with a red ring and white band—the Danish colours—are placed one ahead of the other. The journey time in this instance varies according to weather conditions from about 1¼ hours to 1½ hours.

The carriages and trucks are secured to the deck by brass ring bolts midway between the metals, this being a standard fitting on all Danish train ferries. Cast iron buffers are swung into position after the last vehicle is aboard, and the stern is then boarded up with painted planks, or low iron gates are secured in place. Motor cars and motor cycles, with their occupants, are carried among the railway trucks. In the case of the latest three-track ferries there are permanent buffer stops at the bow end, but on the two-track vessels connections may be made at either end.

A narrow stairway, painted white, leads to the two upper decks, which are separated for second-class and third-class passengers. Excellent restaurants are available on these decks, and glass-screened lounges add to the comfort of the journey. It is an interesting experience to leave the luggage and railway compartment between decks, climb the narrow staircase and enjoy the freedom of the spacious decks for a while, returning to one's compartment as the opposite side is reached.

Full complements of lifebelts and lifeboats are provided on all ferries, and tickets are checked on the vessels, third-class passengers and travellers other than those in about three through carriages, having direct access and exit from the ferries by gangways.

The latest Nyborg—Korsor train ferry, the "*Korsor*," is motor-driven. It has three rail tracks, accommodation for 24 to 25 trucks, carriages or wagons, and 1,500 passengers, and attains a speed of 16 knots. Each of the ferries on this service makes from 10 to 12 journeys every 24 hours. The services are maintained all the year round, although severe fogs and rough seas, and ice that requires the passage of an icebreaker, add to the journey times in the winter months.

The train ferries used between Warnemunde and Gjedser are by agreement worked by Danish State Railway and German State Railway vessels, the service being joint. The Danish ferries are of the two-track type, of 3,000 tons burthen. They have accommodation for 18 trucks and 1,500 passengers, and attain a speed of 16 knots. The German vessels on this service are of the three-track type and in consequence are rather larger.

Most of the Danish train ferries follow general designs. One of the principal characteristics is their hexagonal deck outline, which is probably an outcome of paddle propulsion, although the newer vessels are screw steamers. Nearly all the ferries are equipped with steering rudders fore and aft.

For the Copenhagen—Malmo service double-track steamers with a displacement of 1,600-1,700 tons are used, a special feature of these vessels being the buffer stops on the rail deck, at the stern end. Sixteen hundred passengers can be carried on these vessels, which are fully equipped with saloons and restaurants.

The development of these train ferry services has undoubtedly created a greater flow of both passenger and freight traffic.

Along the Big-Woods Trap Lines

Romance and Forest Lore

A SERIES of axe blazes cut in the bark of the trees, and readable only to the man who is accustomed to woods travel, guide the trapper as he journeys alone, or accompanied by his dog team, over the line of traps he has laid out, in order to secure his harvest of furs for the buyers who demand them in return for the necessities of life. To-day one may journey the length and breadth of Canada on pathways of steel and with no thought for the hardships of those who blazed this trail; yet it is to the trapper and to those who followed in his footsteps that the charting of present-day lines of communication must be credited. There is a romance of the trap line, and it is the romance of Canada.

The line of blazed trees leading from the trapper's cabin over hill and dale and across the surface of frozen lakes is just as important to people in certain sections of Canada to-day as it was in the days when the "Gentlemen Adventurers" of England, trading into Hudson's Bay, sent their ships in search of valuable cargoes of fur. To these people a good fur catch means prosperity, a poor one hardship—and there are years when fur-bearers seem few and far between in districts that have known them in plenty for years previously.



A close-up photograph of a herd of Caribou.

Canada's fur trade dates back to about the year 1500, when Basque and Breton fishermen, coming to the coasts of Canada to fish, traded for furs in their spare time. The fashions at the courts of the French kings demanded more and more furs, and the pelts that the fishermen brought back from this little-known land overseas were of such fineness and beauty of texture that adventurous souls came for the fur trade exclusively. Then came the forming of companies, and the struggles that followed have been written into the history of Canada, as they strove for control of the rich fur trade. To-day there is another branch of the fur trade—the fur farming industry. Black and silver foxes and other animals are reared in captivity for their pelts, and the industry, begun as a venture by two men in Prince Edward Island, has spread to many countries. In spite of the growth of fur farming, however, the trapper following his lines of traps in the bush has not by any means ceased to exist. The annual catch of wild fur-farming animals in Canada totals more than 3,000,000 pelts with a value of more than three million pounds.

Few boys grow to manhood without having passed through that stage when their choice of reading matter is tales of the red-blooded heroes of the "Great Outdoors." There is a time in the life of every healthy boy when he longs to follow the life of those heroes, whether they be cowboys or Indians, train robbers or Mounted Police. There are few men to-day who cannot look back to some period of their youth when, in imagination at least, they traversed the trail through the woods, their trusty rifle at their side, ready to meet any wild animal that dared to show its head. The desire for an experience of this kind, so often repressed on account of its impossibility, may now be fulfilled as the result of a development organised by the Canadian National Railways. This development has opened to the city dweller the trap lines of the northern forests, so that he may spend a winter holiday there, living with the trappers and accompanying them each day as they make their rounds.

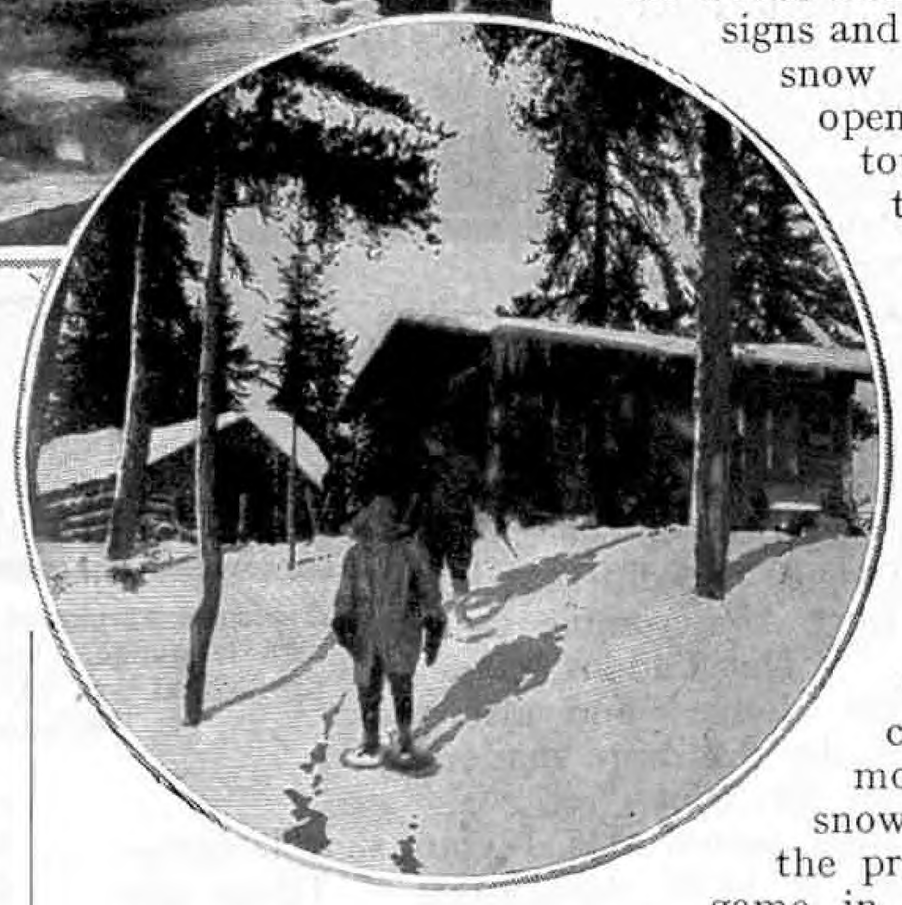
Canada's great northern forests make a strong appeal to everyone who is fond of nature. In the summer months the lakes are teeming with fish, challenging the angler to his best efforts. In the autumn they are a paradise for big game hunters seeking the moose, the caribou, or other trophies of the chase. In winter the forests take on a new form of beauty. Successive falls of snow provide a cushion over which the dog sleigh moves easily and smoothly. Each snowfall gives to trees and bushes fantastic shapes, and provides for the woodsman a "road map" on which he may read the signs that tell him what denizens of the wild have travelled before him. A journey through the forests in winter with an alert woodsman as guide unfolds a new appreciation of the out-of-doors. Each turn of the winding trail brings a new picture. Here and there an open lake gives an outlet to a wonderful panorama of spruce-crowned hills, the home of moose, deer, bear, and other animals; and across this stretch the dog teams make their way in the wake of the guides who break trail for them with their snowshoes.

A moose track, crossing the sleigh trail at right-angles, indicates where the Monarch of the Forest, travelling at top speed, has come upon earlier signs of man, and sought

to put space between himself and these two-legged beings of whom he has good cause to be suspicious. The tracks of a fox crossing and recrossing the earlier half-buried snowshoe tracks tell where Reynard has sought to satisfy his curiosity, while at the same time keeping a watchful eye out for danger. Again it may be the sight of a partridge in a tree; a rabbit whose protective covering blends almost perfectly with his surroundings; a Canada lynx, or some other fur-bearer fading into the protection of tree-covered slopes. All these serve to whet the appetite of the newcomer, and to keep him on the alert for whatever lies just beyond the next turning.

This is the holiday afforded to those who follow the Blanc Bec trails, which are tourist snowshoe and dog team journeys over the trap lines in the north woods of Quebec and Ontario, organised by the Canadian National Railways to meet the ever-increasing demand from city dwellers who wished to see the real outdoors, with the lordly moose and other animals in their native habitat. The system adopted is simple but thoroughly effective. The scheme is conducted by "outfitters" who have taken over the business of conducting parties over their trap lines. The territories of the outfitters stretch almost from the Gulf of St. Lawrence to the shores of Hudson Bay. This region includes thousands of square miles of virgin wilderness, penetrated only by the trapper, the hunter and the frontiersman. During Spring, Summer and Autumn some parts of it are visited by sportsmen for hunting and fishing, but until the C.N.R. scheme came into operation the Winter visitors were only those whom necessity obliged to go there. The game guardians, protecting the game preserves from the activities of poachers, made their regular rounds, each patrolling perhaps 100 square miles of territory.





Above—A typical trapper's cabin; the trapper is stretching a fox skin for market. Below—One of the cabins for housing visitors to the Blanc Bec trails.

For the comfort and convenience of hunting and fishing parties visiting the territories during the Summer, cabins were built on the shores of lakes or streams, perhaps a day's snowshoe journey apart. As the canoe and back-pack are the only means of transportation of goods during the Summer, so the dog sleigh is the only means of transporting food and camping equipment once the snow has fallen. This is the sort of journey in which the lover of the wilds is invited to participate.

A brief account of one of these organised snowshoe journeys will be of interest. Leaving Montreal in the evening the party arrived at the C.N.R. station at Roberbal in the Lake St. John district of Northern Quebec in time for breakfast next morning. After breakfast all the outfits were inspected to see that they included proper clothing for the trail, and then each member of the party was provided with a pair of bear-paw snowshoes of the type used in the woods of that section of Canada. From the hotel the first part of the journey to the woods was continued by dog teams. A day's journey, with a halt for lunch at a fishing camp and another for supper at a lumber jobber's camp, brought the party in sight of the first of their cabins on the Blanc Bec trails. The last few miles of this day's travel were through almost virgin timber and across frozen lakes. At the cabin the cook, who had travelled ahead, had a good fire going. Blankets were spread out to absorb some of the warmth radiated from the stove, and within a short time the tourists, yawning and tired from their first day in the frosty air, were fast asleep.

The next day's journey and those of the succeeding days differed only in the details of direction and of discoveries. Under the careful supervision of the leader and his guides—men who had spent their whole lifetime in the woods and to whom the signs and tracks in the snow were as an open book—the tourists were taken in various directions over the trap lines that were laid out on the preserve. On each journey tracks of wolf, fox, caribou, or moose in the snow indicated the presence of big game in the vicinity, and from looking at the tracks the guides could tell the tourists almost everything about the animals and their movements. Each of the trap lines traversed was indeed a lesson in woodcraft learned from men to whom the signs of the forest were instantly discernible.

This continued up to the finish of the trip when a successful attempt was made to approach moose sufficiently close to permit of photographing them in the woods with a cinematograph. This entailed many miles of heavy snowshoeing, but excellent photographs were obtained, and subsequently were incorporated in a film circulated by the C.N.R. to give prospective tourists an idea of what they may expect on such outings.

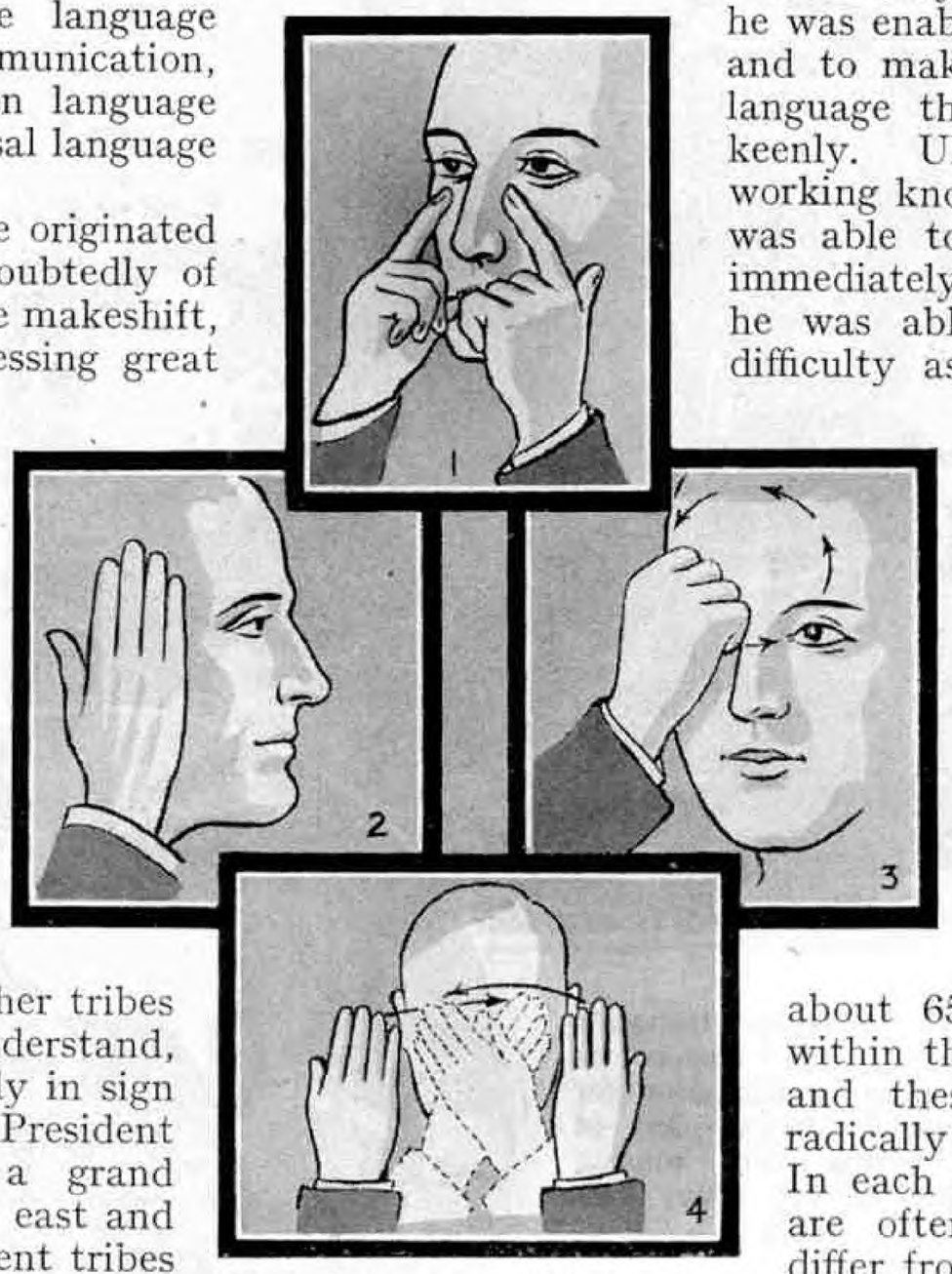
The Sign Language of the Red Indians

Talking with Fingers and Hands

By Andrew R. Boone

THE Red Indian population of North America, during its days of prosperity, consisted of a large number of tribes each speaking a more or less distinctive language. Sometimes these languages differed only in unimportant respects and might be described as dialects; in other cases they were so utterly different that the tribes speaking them could not understand one another. When two such tribes met, however, the language difficulty did not prevent communication, because the place of the spoken language was taken by a wonderful universal language of signs.

When the Indian sign language originated we do not know, but it is undoubtedly of great antiquity. It is not a crude makeshift, but is a genuine language possessing great descriptive powers and beauty of imagery. Every time strange tribes of Indians gathered together they "conversed" freely by means of their sign language, and very rarely was any difficulty encountered. Speaking of this language, Little Raven, who at one time was head chief of the southern Arapahoes, said: "I have met Comanches, Kiowas, Apaches, Caddos, Snakes, Crows, Pawnees, Osages, Arickarees, Cherokees, Choctaws, Chickasaws, Foxes, and other tribes whose vocal languages I did not understand, but we have communicated freely in sign language. The summer after President Lincoln was killed we had a grand gathering of all the tribes to the east and south of us. Twenty-five different tribes met near old Fort Abercrombie on the Wishita River. The Caddos made a different sign for 'horse' and also for 'moving'; but the rest were made the same way by all the tribes."



Typical examples of Red Indian sign language. (1) "Cry"; (2) "Deaf"; (3) "Crazy"; (4) "Ashamed."

For a very long period this Indian sign language went unrecorded by white Americans. Those who saw it in use were interested, but they made little or no attempt to learn the meaning of the signs. Presently, however, there came along a white man named William Tomkins, who lived among the Indians and studied their languages and customs for over 40 years. As a boy he worked on a cow range at the edge of the Sioux reservation, and he chummed with the Blackfoot tribes, the Cheyenne, Arapahoe, and others. In this manner he learned to talk to the Indians in their own tongue, and from them also he learned the wonderful sign language. Subsequently he produced the first Indian sign language dictionary, containing about 800 word signs and their meanings.

When Tomkins first attempted to study the sign language he found considerable reluctance on the part of the Indians to give him any information. For a long time the utmost he could do was to learn single words at odd moments when opportunity arose, and as such occasions did not occur very frequently his progress was slow. Gradually, however, as he proved the sincerity of his friendship for the Indians, he was enabled to learn their vocal language and to make greater progress in the silent language that had aroused his interest so keenly. Ultimately he acquired a practical working knowledge of sign talk, and thus he was able to go among strange tribes and immediately find friends. On many occasions he was able to help tribes that were in difficulty as the result of some misunderstanding between them and the whites, and this help was greatly appreciated.

Tomkins asserts that nowhere else in the world has there been found so great a number or diversity of languages as in North America. Wholly distinct tongues were often confined to groups, composed frequently of no more than a few score persons, verbally incomprehensible to the neighbouring tribes. There are, he says, about 65 stocks or families of Indians within the territory of the United States, and these differ among themselves as radically as Hebrews, Chinese and English. In each of these linguistic families there are often separate dialects, which also differ from each other as much as do the English, French and German divisions of the Aryan linguistic stock. Indians in a variety of tribes have stated that in former times the sign language was the one common and universal means of communication between the tribes speaking different vocal languages. As the Indians expressed it: "All the old people in all the tribes used it."

"Turn to any good dictionary," says Tomkins, "and you will find that most of our words are derived from Greek, Latin, or Anglo-Saxon roots, which may be comparable to, and in many cases are derived from, pictographic symbols or descriptive gestures. In sign language the meanings of the basic idea signs are first understood, and then simple signs are combined to form compound signs to express more elaborate ideas. The study of the sign language will be well worth while if it does no more than direct attention to the fact that our words are not arbitrary affairs, but are constructed part by part just as is the case in the sign language;

and that very likely the basic words from which they come were represented originally by signs and pictographs.

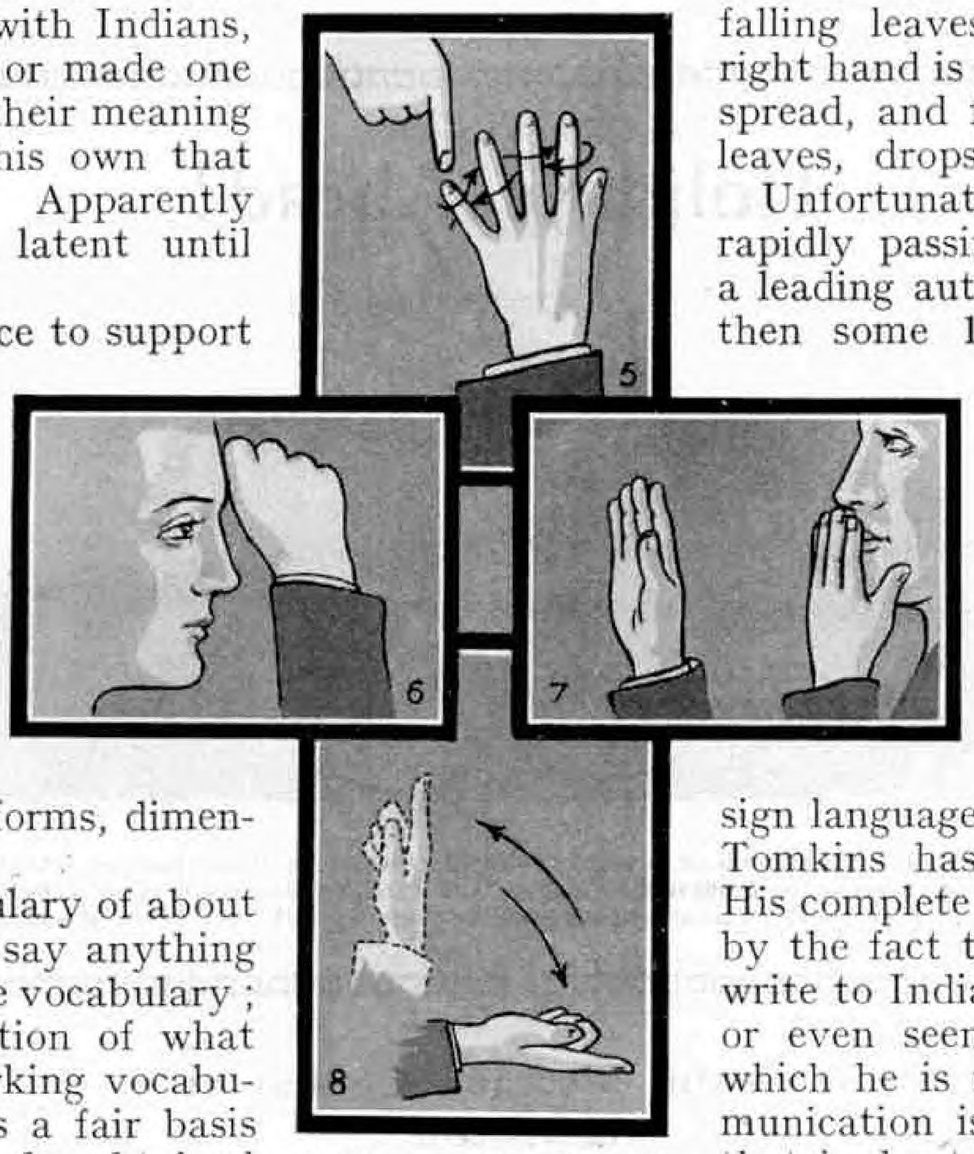
"Children employ intelligent gestures long before they can deliver articulate speech, although parents begin early to give them instruction in the latter, but none in the former. Children learn language only through the medium of signs, and long after they understand verbal instructions they observe the face of mother or nurse as if to seek some translation or explanation of their words. A white man at the time of his first contact with Indians, without ever before having seen or made one of their signs, will quickly catch their meaning and will also produce signs of his own that the Indians will comprehend. Apparently the ability to talk in signs is latent until called forth."

There is a great deal of evidence to support the view that man, when first in the possession of all his present faculties, did not choose between voice and gesture, both being originally instinctive. One was never used to the exclusion of the other. At the outset man imitated with his voice a few of the sounds of Nature; while with gestures he expressed motions, positions, forms, dimensions and distances.

According to Tomkins a vocabulary of about 200 signs enables the Indians to say anything that we can say with our elaborate vocabulary; and this brings us to the question of what really constitutes a practical working vocabulary in any language. Perhaps a fair basis for the selection of words might be obtained as the result of the study of the words most commonly used by children of various ages. An investigation of this nature carried out by the Russell Sage Foundation of New York resulted in the discovery that 10 words—the, and, of, to, I, a, in, that, you, and for—recur so frequently as to constitute one-fourth of all the words written; while about 50 words constitute half of all the words written in English. From this it may be seen that a vocabulary of 500 words should equip a fairly good sign talker, and this could be acquired in less than one month.

The Indians have simplified their signs to the utmost. They never use the articles "the," "a," and "or"; or the words "why," "where," and "when" at the beginning of a question. In order to express "What do you want"? they use the signs indicating "Question — you — want." Where we should say "Will you make the fire?" an Indian, by three signs, says "Question — you work — fire." To express the idea of "done" the Indian brushes his hands together; he beckons with his finger when he wants you to approach. What could be more expressive than representing "escape" by crossing the wrists with the hands closed and then separating the hands by moving them to right and left? To signify "mourn" the Indian places his fingers at the back of his head as though shearing his hair, and then indicates with his forefingers tears flowing down his cheeks. For "dance" he raises both hands and wriggles them up and down; and a book is indicated by holding his hands before him, palms upward, and reading them. To represent "bridge" he combines the signs for "river" and "across."

The Indian thinks with his heart and uses the sign "drawn from the heart" to express that idea. His sign for "good" is the flat hand spread upward and level with the heart. The sign language gets down to basic meanings. For instance, to express the idea of anger, the right hand is placed against the forehead and turned around to illustrate a twisted brain. A very poetic illustration may be found in the sign for "autumn." This season is the time of falling leaves, and in the Indian sign the right hand is extended upward with the fingers spread, and from it the left hand, indicating leaves, drops down with a waving motion.



Indian signs for (5) "Among"; (6) "Angry"; (7) "Astonish"; (8) "Arise."

Unfortunately the Indian sign language is rapidly passing away. Half a century ago a leading authority estimated that there were then some 113,000 sign talkers among the Indians; now this number has sadly decreased. Compulsory education and the general speaking of English have brought about a change of mind in later generations, and to-day many Indians speak French and German far better than they can talk the sign language.

In view of this decay of the sign language it is very fortunate that William Tomkins has made his minute study of it. His complete mastery of the language is shown by the fact that he is able by means of it to write to Indians whom he has never spoken to or even seen, and belonging to tribes with which he is not familiar. This written communication is carried out by "pictography," that is, by transferring the necessary signs to paper in the form of little pictures or drawings. Written communication in the sign language is necessarily a somewhat slow process, but it is quite practicable.

Tomkins has made a permanent record of the results of his studies in the form of a dictionary of the sign language, the only one of its kind yet published. This dictionary contains a very remarkable collection of nearly 800 Indian word signs and their meanings, and it provides a complete guide to the study of the language. Tomkins has been awarded a certificate to teach the language in the State of California, and he is very enthusiastic in carrying on his classes.

Although, by reason of its clearness and simplicity, the sign language can be acquired rapidly by any normal person, the effectiveness with which it is used depends to a considerable extent upon the temperament of the user. Even Indians who are perfectly familiar with every detail of the language vary greatly in the results they produce by means of it. They may present either a spiritless succession of set signs which, although perfectly understandable, arouse no enthusiasm; or they may produce a really expressive pantomime of eloquent gestures.

As it is with actors, so it is with users of the sign language; those who feel most intensely what they seek to impart succeed in expressing the fullest meanings. Many an old plainsman has described the interest he used to feel in watching a group of Indians conversing in sign with extraordinary rapidity and with an enthusiasm that gave eloquence to every movement.

Light Power Units—(*Continued from page 456*)

as part of a train if required. The coach is capable of speeds up to 50 m.p.h., and a point of interest is that it is able to draw a trailer, with a seating capacity practically equal to its own, without serious diminution of speed.

The foregoing details are descriptive of what may be termed the standard Clayton steam rail car; but in addition to this type articulated units also have been supplied. Cars of this type, supplied to the Egyptian State Railways, each consist of two separate coach bodies mounted on an individual bolster in the centre driving bogie, thus enabling either body to be removed without interfering with the other. These coaches contain seating accommodation for a total of 115 passengers, made up of 17 first-class, 20 second-class, and 70 third-class.

A driving compartment is provided at each end, while controls in the boiler compartment in the centre of the coach enable the vehicle to be manœuvred also from the footplate when required. The arrangement of the controls is simple, and care has been taken to ensure that unauthorised persons cannot interfere with them in any way. The driving compartments have ample look-out windows, arranged so that the top halves may be lowered if required, and collapsible gates protect the side openings. A driver's seat is provided, from which the regulator, reversing and brake levers may be operated conveniently.

The boiler, water tanks and coal bunker are mounted on the driving bogie underframes in the centre of the coach. A hinged flap covers the articulated joint. The boiler is of the latest standard vertical water-tube pattern, and the engine is of the standard Clayton rail coach type, carried horizontally between the two axles, and mounted on bearings on one axle. The overall length of the coach is 101 ft. 7 in.; the bogie centres are placed 41 ft. 10 in. apart, and each bogie wheelbase is 7 ft. The complete unit in working order weighs 45 tons 15 cwt.

The Pineapple—(*Continued from page 435*)

is actually exposed only for 1 minute 31⅕ seconds; after that it is safely in the can. Even during that brief interval, the fruit is not touched by hand. All the workers at the trimming and packing tables and at the slicing machines are women. Their hair is enclosed in large white caps; they wear long white aprons from throat to skirt bottom, and on their hands are rubber gloves. The cans pass through special washing machines that ensure absolute cleanliness, and in addition all cannery machines, tables and floors are sterilised once during every day shift and twice during every night shift. In addition every stage of the various processes is carried on under the keen supervision of experts.

For the illustrations and much of the information contained in this article we are indebted to the Hawaiian Pineapple Company Ltd.

World's Largest Vacuum Tube

The largest vacuum tube in the world is now being built in California by the scientists of Mount Wilson Observatory. It is being constructed of corrugated steel and when complete will be a mile in length. The tube is being made to enable the speed of light to be measured accurately. In recent experiments of this kind the atmosphere exerted a disturbing influence, and it is hoped that the use of the giant vacuum tube will give more satisfactory results.

Holidays Ahead!



Summer days! What many of us will be doing in a few weeks' time—bathing, lounging or playing games on the sands in the sunshine, and watching the passing of an occasional ship. This reader's photograph suggests the camera possibilities of the seaside.

Successful Meccano Contest at Lewisham

Meccano model-builders residing in the south-eastern district of London had the opportunity recently of competing in a special model-building competition organised by Mr. F. C. Cabeldu, the well known Meccano dealer of 371, High Street, Lewisham.

Local Meccanoites took great interest in the contest and submitted a fine collection of models. The entries were divided into three sections, Section 1 being for "Simplicity" models, Section 2 for "Original" models, while Section 3 was reserved solely for models of aeroplanes. It was decided to award the prizes according to public opinion and with this end in view the various models were displayed at Mr. Cabeldu's premises, where the public were invited to attend and cast votes for the prize-winning models. On the occasion of the prize-giving a great crowd assembled in the shop, and its capacity was so severely taxed that dozens of people had to be content with a place outside the windows while others crowded the doorway. The principal prizes were allocated according to the following list.

Section 1: First Prize (Meccano Clockwork Motor), L. J. Austin, Catford; Second Prize (Standard Mechanisms Manual), C. Deadman, Catford.

Section 2: First Prize (Meccano Steam Engine), J. D. Bedford, Catford; Second Prize (Miniature Tool Set), D. Cook, Catford; Third Prize (Speed Boat), S. Hedger, Catford; Fourth Prize (Aeroplane) H. Woodhead, Catford.

Section 3; First Prize (Aeroplane), E. C. D. Terry, Forest Hill; Second Prize (Speed Boat), G. Merrick, Catford.

The First Prize in Section 2 was awarded for a splendid model of the famous "Golden Arrow" racing car and the Second Prize for a very amusing model representing a grand piano together with pianist and violinist. L. J. Austin secured his prize in Section 1 with a seaplane and C. Deadman submitted a reciprocating engine. Other entries of considerable merit were H. Woodhead's motor cycle and sidecar, and a coupé motor car by S. Hedger. Models of biplanes secured awards for E. Terry and G. Merrick.

Mr. Cabeldu proposes to organise another competition in the early autumn of this year and local readers who would like to participate should send their names, addresses, and ages to 371, High Street, Lewisham, S.E.13, when they will be given full particulars of the contest in plenty of time to send in their entries.

Novel Use for Compressed Air

In the past great difficulty has been experienced in New England in keeping the entrances to the penstocks of hydro-electrical power stations clear of ice. In that portion of the United States, winter weather is very severe and when a dam freezes over, the pressure of the ice on its walls is liable to cause serious damage. The danger is greatest at the penstocks, for a steady current of water flowing down the huge tubes causes ice adhering to the walls to exert a steady pull on them, and this increases as the level in the dam falls.

The only means of dealing with the difficulty is to keep the ice away from the walls. In the past this could only be done by cutting channels along the intake side walls. This meant removing ice from a space, about eight feet in width, extending over a considerable length. The operation had to be carried out two or three times each winter and was costly.

At a station at Turner Falls, Massachusetts, an entirely new scheme has been introduced. There the engineer in charge hung a pipe along a wall at a depth of 12 ft. This was perforated at intervals and nozzles fitted into the holes. The pipe was then connected to a compressor that furnished air at a pressure of about 10 lb. per sq. in. The bubbles of air forced out from the jets rose to the surface and were found to be quite effective in preventing the formation of "shell" ice, as it is called, along the wall.

The experiment was so successful that compressed air is now used for the protection of each intake gate valve and sluice gate of the dams at Turner Falls.

The air is used at a pressure that does not usually exceed 20 lb. per sq. in., and as the machinery requires very little attention, the cost of preventing damage from ice is much less than that of the old method of laboriously cutting it out.

A Splendid Sports Catalogue

The new catalogue of A. G. Spalding and Bros. (British) Ltd., is the most interesting and best-produced publication of its type that we have seen. Its 127 pages cover outfits for every outdoor game that is worth consideration, and many indoor games also. It is indeed almost impossible for anyone to look through the catalogue without finding some piece of athletic equipment that is just exactly what he wants, and which he feels he must have immediately.

Commencing with golf clubs, we pass on to equipment of all kinds for tennis, cricket, football, hockey, baseball, lacrosse, badminton, croquet, bowls, and a variety of sports such as running, throwing the hammer, and hurdling. Indoor sports and games are also well represented, a particularly interesting section dealing with gloves, punchbags and other equipment for boxing. The different sections of the catalogue are arranged in such a manner as to make it easy to find quickly any desired item, and the excellent illustrations that are plentifully supplied on every page show clearly what the various items are like. Each article has been designed specially for its purpose by skilled experts of long experience in this class of work, and in every case the purchaser may be certain of sound British quality and workmanship.

We strongly advise those who are in want of equipment for any game or sport to write for this catalogue, which will be sent free on request if applicants mention the "*Meccano Magazine*." (See advertisement on page 503).

New Cars for London P.O. Tube Railway

By E. Flaxman

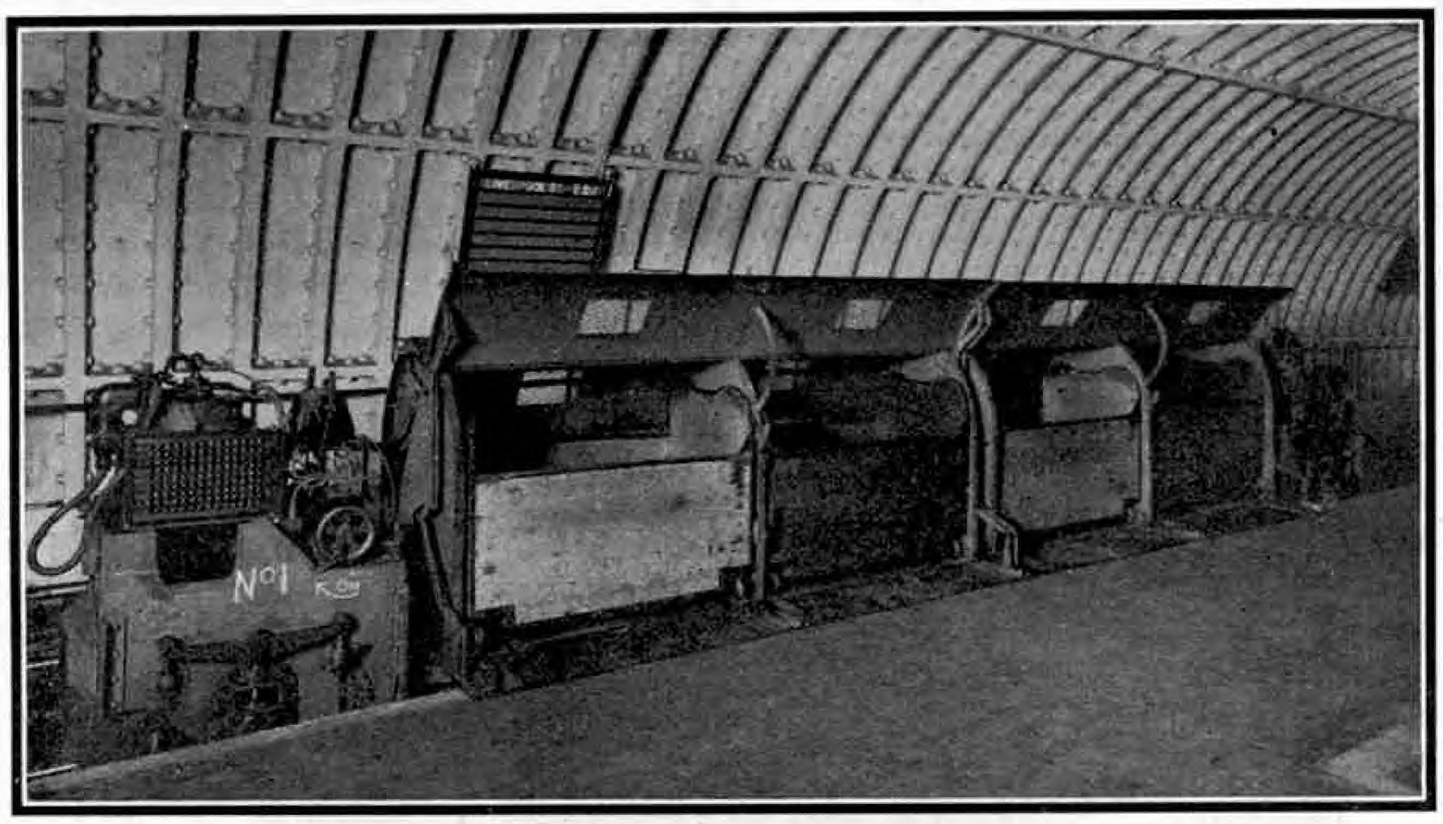
IN the "*M.M.*" for October, 1928, we gave a detailed description of the London Post Office Tube Railway.

This railway was constructed with the object of solving the problem of the transportation of letters and parcel mails between the London railway stations and the district post offices. For many years before the War it had been evident that the road van service was rapidly becoming unable to cope with this traffic, and in 1909 a committee was appointed to consider the question of providing a substitute. After making exhaustive inquiries on the Continent and in America, the committee decided that the most satisfactory solution would be an underground railway operated automatically by electricity. A scheme was worked out and tunnelling was commenced in 1914, but the Great War brought work to a standstill. After the War work was resumed, but it was repeatedly delayed by various difficulties, and it was not until December, 1927, that the railway was finally completed and put into operation. This automatic railway was the first of its kind in the world, and its construction aroused widespread interest.

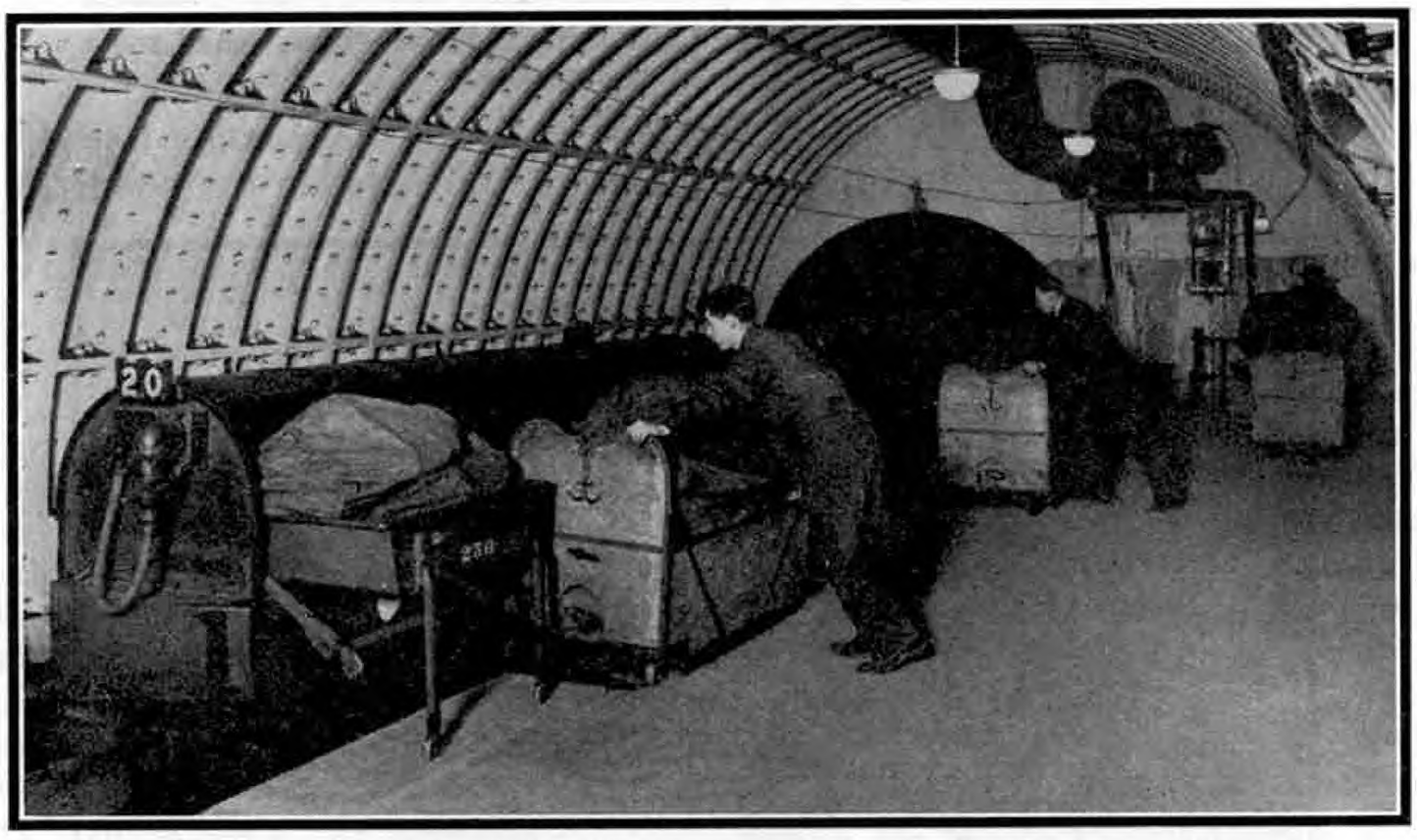
The railway was immediately successful in relieving the London surface street traffic to a considerable extent, and also in reducing the time taken to deliver mail from a terminal station to other points on the route. It has now been in operation for over two years, and the experience gained in working has enabled delays from various causes to be reduced to about half the figure at which they stood during the first few months.

One difficulty encountered has been the small size of the cars. These were not long enough to bridge the gaps between the live rails at crossings, and for this reason it was found necessary in practice to make up each train of two or three cars, irrespective of whether the load required more than one.

During the past few months trials have been made with the new experimental car shown in the accompanying illustration. This car has a motor at each end, mounted on a separate bogie to allow for curves. The whole of the car itself therefore can be used for the special containers, which run on casters. While the original cars can each hold only one container and two special slide trays, the new cars will take four containers, thus giving a total capacity three times as great. The actual figures of capacity are 1,120 lb. per car with the present type, and 3,400 lb. per car with the new model. The new cars can be run as single-car units, and this should result in a great increase in the operating efficiency, and of course also in the capacity of the line.



The new experimental car for the London Post Office Tube Railway. Note the motors separate from the mail carrier.



Loading a train of three cars of the original type.

The trials that have been carried out have proved highly satisfactory, and the original cars will be gradually withdrawn and replaced by the new type. The experimental car looks a trifle ungainly, but those that will actually be put into service will be constructed rather differently, with less of the wiring, etc., visible.

It is interesting to note that when the construction of the Post Office Railway was recommenced after the War, and it was decided to go forward with the system of automatic driverless trains, the municipal engineers of Chicago declared that the scheme would be impracticable!

We are enabled to reproduce the accompanying photographs by courtesy of the Postmaster-General.



These pages are reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of general interest. These should be written neatly on one side of the paper only, and they may be accompanied by photographs or sketches for use as illustrations. Articles that are published will be paid for at our usual rates. Statements contained in articles submitted for these pages are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

A Camera in the Cairngorms

The Cairngorm Mountains are between the rivers Dee and Spey. They consist of a huge expanse of granite hillside scarred by deep glens, and the scenery includes some of the wildest in Great Britain. Several of the summits are over 4,000 ft. in height, and in the corries, or circular hollows on the hillsides, snow lies late into the summer. One snowdrift, in fact, has never been known to melt away entirely.

The white wreaths of snow on the hills and the glorious pine forests in the glens make the district a paradise for photographers. It is a paradise that has to be won, however, for the vast scale of hills and their remoteness make long walks and stiff climbs necessary. To retain in a photograph an impression of mountain grandeur is difficult, but those who explore the hills with a camera will never regret it.



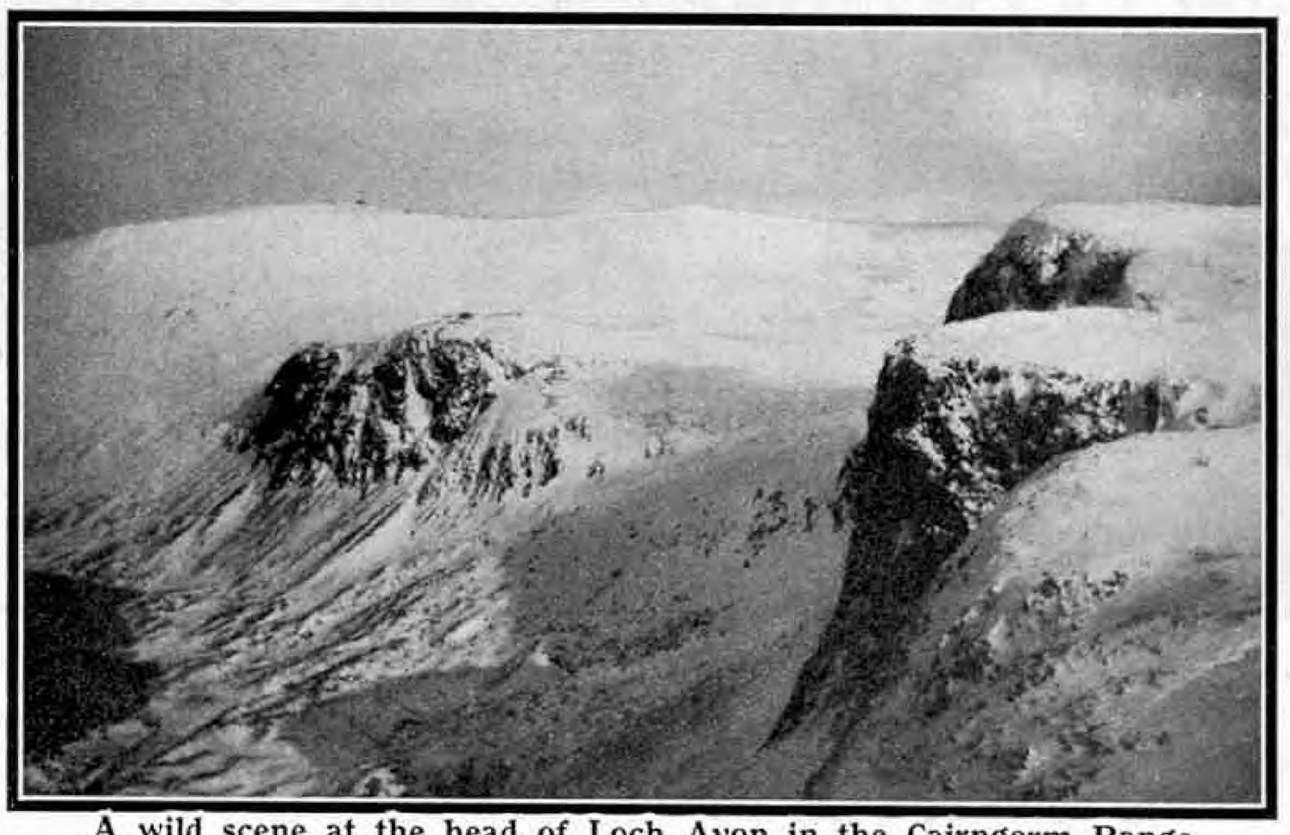
Larig Ghru, the great pass across the Cairngorms, in springtime, when snow still lingers on the summits.

The tramp from Braemar in Glen Dee to Aviemore in Strath Spey is perhaps the finest walk in Britain. The route follows the great pass of the Cairngorms, the Larig Ghru, and there is always the chance of seeing a golden eagle hovering above, for the bird still nests in these fastnesses.

The hills themselves, when viewed from a distance, appear rounded and almost featureless. Of the four principal summits, Ben Macdhui, Brae Riach, Cairntoul and Cairngorm, it is the last named and lowest that has given its name to the range and also to the well-known stones, which are found on the hillsides. The summits remain snowcapped until April.

Ben Macdhui is the home of a gigantic grey spectre that is said to appear to solitary trampers. Photographers out for a really sensational snap might camp out on the summit in the hopes of meeting it, but possibly they will find that, like the better-known spectre of the Harz Mountains, that of Ben Macdhui is only a shadow cast on a wall of mist.

T. R. BARNARD (Manchester).



A wild scene at the head of Loch Avon in the Cairngorm Range.

Glass Bottle Making

On a visit to a glass bottle making works I was greatly interested in the wonderful machine in which the glass is blown to the desired shape. This is circular in shape and slowly revolves. The moulds are arranged around its circumference and as each reaches a trough of molten glass it opens and dips into the liquid, taking up the amount required. As the mould passes on, it closes and air is forced in to blow the glass into shape.

At a certain point the mould again opens and the newly-formed bottle falls into a chute in which it is conveyed to the annealing furnaces. There it is allowed to cool slowly and steadily.

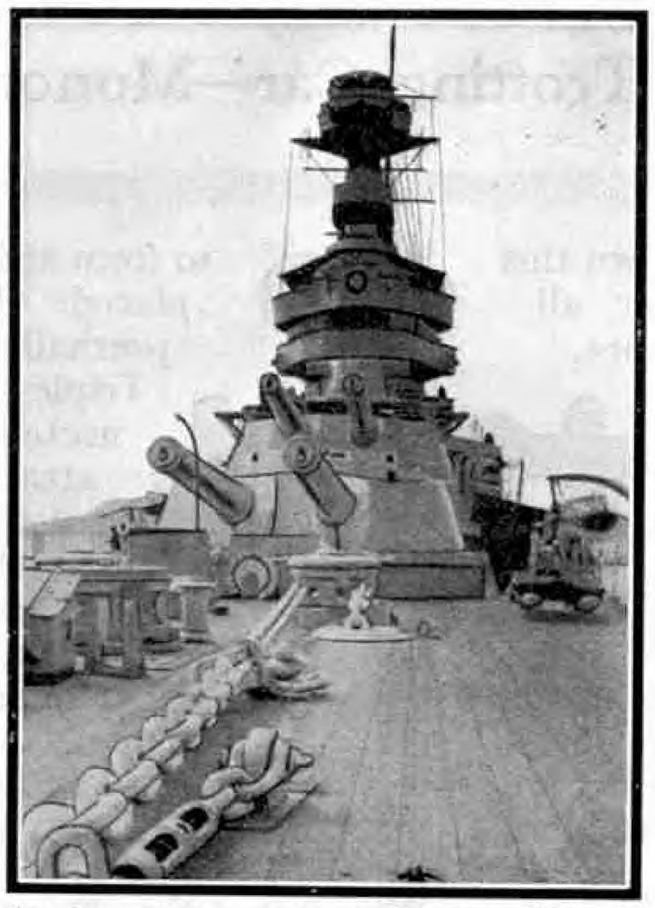
P. H. PETTIFOR (Blackheath).

Mediterranean Fleet Visits Stamboul

To the members of the British Colony of Stamboul the visit last year of part of the Mediterranean Fleet was the most interesting event that had occurred for a considerable time. All were particularly interested to learn that the squadron included H.M.S. "*Courageous*," the famous aircraft carrier, and H.M.S. "*Queen Elizabeth*," the equally well-known super-dreadnought.

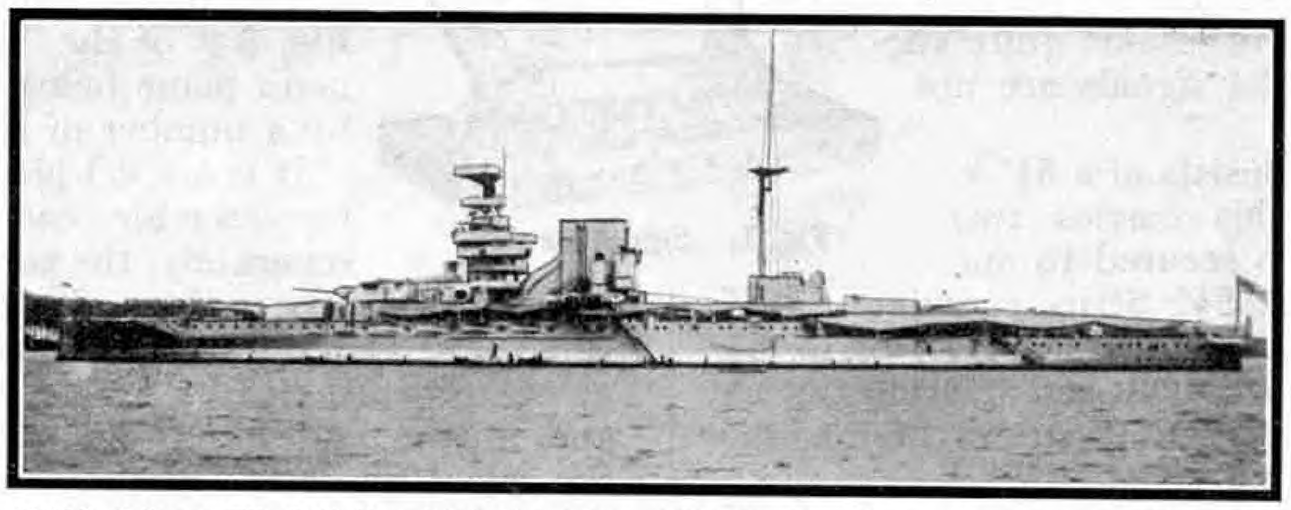
The boys of our school were invited to visit the second of these vessels, and needless to say all eagerly seized this wonderful opportunity. On going aboard we were very quickly impressed by the colossal scale on which everything was made, and also by the smartness and neatness of every section of the great warship.

After inspecting the 15 in. guns, each of which weighs 700 tons, and may be swung about as if it were a feather, we visited the small room above them from which instructions are given to the gunners. The chapel, the boxing ring, the canteens and the accommodation provided for the officers and crew were all visited in turn, the members of the crew who acted as guides being very obliging and ready to explain everything as fully as possible.



The forward guns and control tower of H.M.S. "Queen Elizabeth."

The boys of H.M.S. "*Queen Elizabeth*" paid a return visit to our school, and were entertained to tea after an exciting football match against the school team.



H.M.S. "Queen Elizabeth," a photograph taken at Stamboul on the occasion of the visit described in the accompanying article.

The visit of the Fleet concluded with a wonderful air display. The population of Stamboul turned out in enormous numbers to watch the British airmen loop the loop and carry out other daring "stunts" that amazed the onlookers, for nothing of the kind had ever previously been seen in Stamboul.

P. GREGORY (Stamboul).

Tin Smelting in Cornwall

Every visitor to Cornwall naturally becomes interested in the tin mining industry, which has been carried on there since prehistoric days. During a stay in the neighbourhood of the mines I was not fortunate enough to make the descent into the underground workings where the miners blast out the tin ore, but I was able to see the interesting process by which the metal is extracted.

The first step consists in pounding the ore to a fine powder by means of huge hammers. This is done in iron vessels called "stampers," and a swiftly running stream of water washes the crushed ore away into settling tanks. There it separates out as a red mud, which is then further washed on revolving tables, or on shaking belts that pass over rollers, in order to remove the last traces of sand.

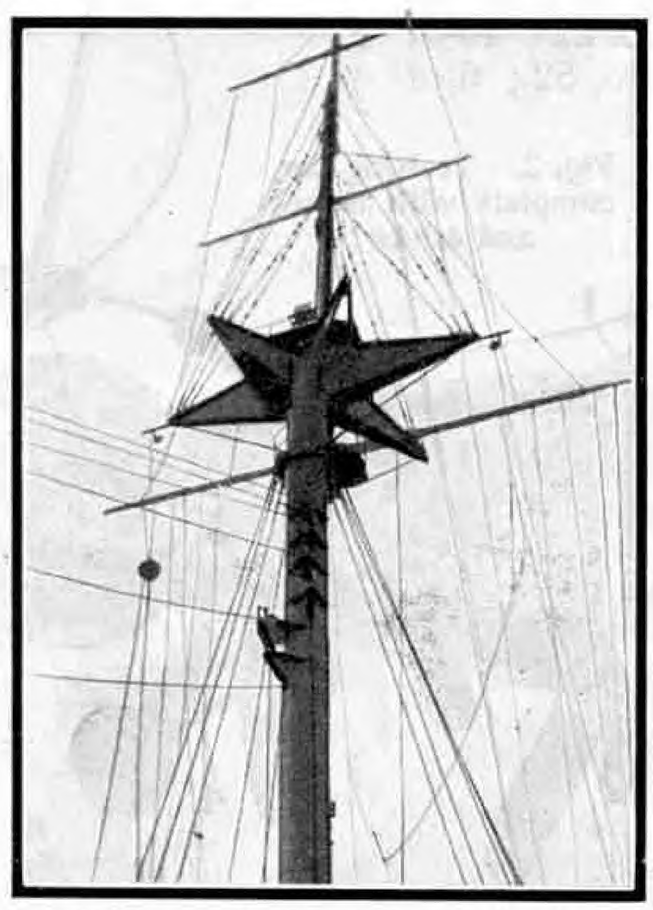
The tin-bearing mud is then smelted in huge reverberating furnaces. Through a trap-door it is dropped on to the revolving furnace floor, which is cone-shaped and slightly tilted so that one side is much steeper than the other. The heat of the furnace separates the tin from the ore as it is slowly carried round on the rotating cone, and the roasted material is drawn towards the edge by a man who uses a rake for the purpose. From the steeper side the tin and dross fall on to a stone floor, where they are spread out to cool.

The tin so formed is not pure, but contains traces of iron. From this it is freed by means of a number of huge electro-magnets, under which it passes on a travelling belt. The first magnets to act on the tin are not very strong, but the last in the line are more powerful and arrest every particle of iron. The tin is then sent to a refinery, where the last trace of impurity is removed from it in preparation for its use in industry.

G. A. GEACH (Sheffield.)

Voyage in a Banana Ship

When on a voyage to Colombia and back in one of the ships employed in the banana trade, I was greatly interested in the precautions taken to ensure that on arrival the fruit is in perfect condition. An even temperature is maintained in the insulated holds in which the bananas are stored, and in them there is no metal work that may come in contact with the fruit.



Complications! A view of the masthead of a modern fighting vessel.

On arrival at the Colombian port the thick insulated hatches were taken off and the ends of belt conveyors were lowered into the holds. Along these came bananas from the wharf, on which train load after train load arrived from the plantation. About 20 hours were occupied in taking on board about 100,000 stems, and the vessel immediately sailed for this country.

The air that circulates through the holds containing the bananas becomes loaded with carbon dioxide and in order to remove this, twice a day fresh air is allowed to enter them. This is done only when the temperature on deck exceeds that in the holds. In cold weather great care must be taken, for if the temperature falls below 51°F. the bananas "freeze" and become incapable of ripening.

R. K. JOHNSON (Pontypool).

New Meccano Models

Signal Gantry—Trotting Car—Monoplane—Tugboat

ALTHOUGH the selection of models shown this month is of a very varied character, all the examples have one common feature, for each is representative of a well-known method of travel. First, in Fig. 1 we have a model Three Arm Signal that will immediately bring to mind locomotives and railways generally. Fig. 2 shows a model Trotting Car, and represents the somewhat out-of-date but picturesque form of travel provided by horses, while the model Monoplane shown in Fig. 3 illustrates the latest practice in flying machine design. Finally, sea travel is depicted by the Tug Boat reproduced in Fig. 4.

Three Arm Signal

The junction signal shown in Fig. 1 is intended for controlling a three-way point, the tallest arm being for the main track while the two lower arms control the branch lines. Models of this type can be incorporated in a Hornby layout quite successfully when correct model signals are not available.

The base of the gantry consists of a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate and this carries two Trunnions. A $12\frac{1}{2}''$ Strip is secured to one Trunnion and a horizontal $5\frac{1}{2}''$ Strip carrying a $2\frac{1}{2}''$ Strip at each end, is secured to the $12\frac{1}{2}''$ Strip by means of a Flat Trunnion. The signal arms, which consist of $2\frac{1}{2}''$ Strips carrying Pulleys, are pivoted to the uprights by lock-nutted bolts.

The cord from each signal arm is passed round the shanks of bolts and tied to the $2\frac{1}{2}''$ Strips that form the operating levers. These are pivoted on a $\frac{3}{8}''$ Bolt that is secured by two nuts to the second Trunnion mounted on the base. The three levers are spaced apart by Washers.

The parts required to build this model are as follows: 1 of No. 1; 1 of No. 2; 8 of No. 5; 3 of No. 22; 15 of No. 37; 9 of No. 37a; 2 of No. 38; 1 of No. 52; 6 of No. 111c; 2 of No. 126; 1 of No. 126a.

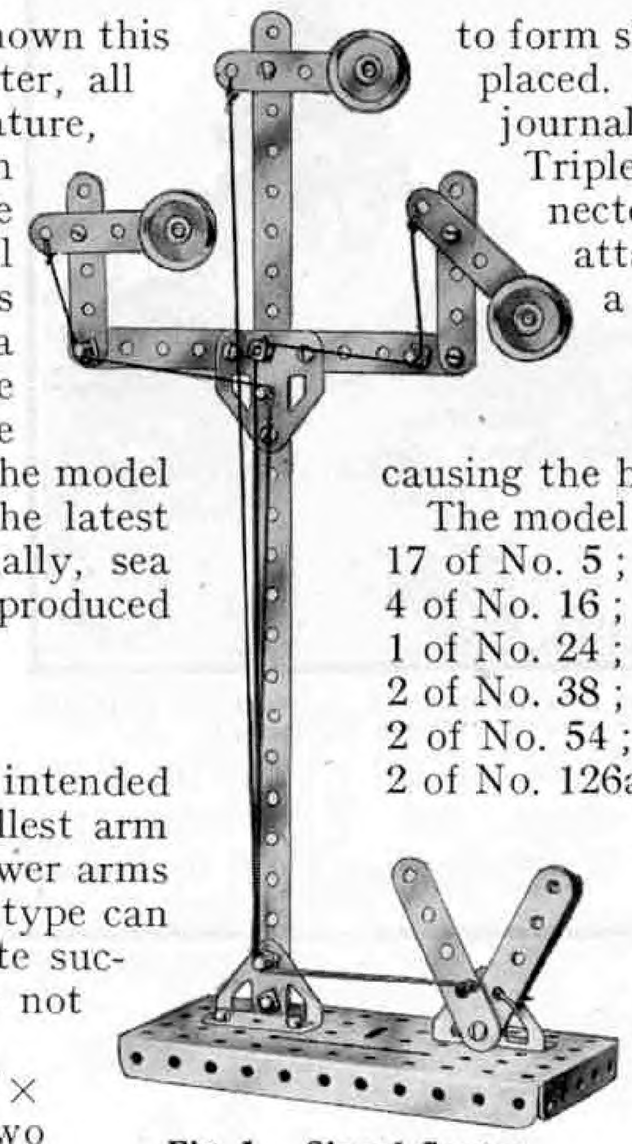


Fig. 1. Signal Gantry.

Trotting Car: An Amusing Model

The Trotting Car, shown in Fig. 2, forms a pleasant diversion from the more serious side of model building. The movements of the horses are very amusing, and add much to the realism of the model.

A $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip bolted across the ends of two $5\frac{1}{2}''$ Strips, forms the driver's seat. The $5\frac{1}{2}''$ Strips are extended, by similar Strips overlapped four holes, to form shafts between which the two "horses" are placed. The Rod carrying the large road wheels is journalled in two Flat Trunnions and carries a Triple Throw Eccentric 2. The latter is connected pivotally by the $5\frac{1}{2}''$ Strip 4 to a $2\frac{1}{2}''$ Strip attached to the Bush Wheel 1, which is fixed on a short Rod carrying two Cranks, to which the horses' heads are secured. As the model travels along, the Eccentric imparts a rocking motion to the Strip 3, thus causing the horses to "nod" their heads.

The model comprises the following parts: 6 of No. 2; 17 of No. 5; 2 of No. 10; 1 of No. 11; 2 of No. 15a; 4 of No. 16; 2 of No. 19b; 4 of No. 22; 1 of No. 22a; 1 of No. 24; 4 of No. 35; 42 of No. 37; 1 of No. 37a; 2 of No. 38; 1 of No. 44; 3 of No. 48a; 1 of No. 48b; 2 of No. 54; 1 of No. 59; 2 of No. 62; 2 of No. 90; 2 of No. 126a; 1 of No. 130.

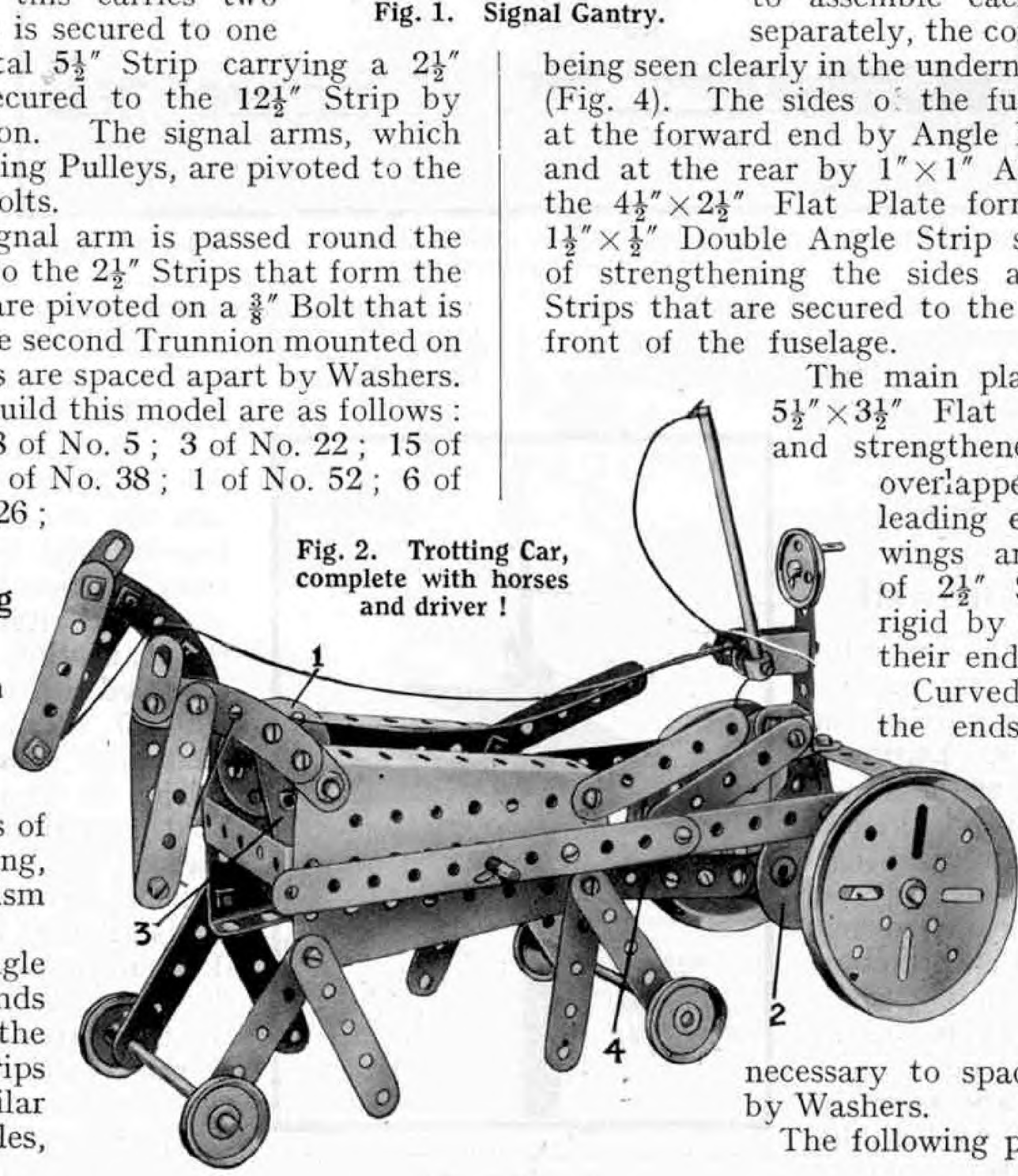


Fig. 2. Trotting Car, complete with horses and driver!

"Parasol" Type Monoplane

The model cabin monoplane shown in Fig. 3 is of the "parasol" wing type, the main plane being held above the fuselage by a number of supporting struts.

It is a good plan, in building the model, to assemble each side of the fuselage separately, the construction of this portion being seen clearly in the underneath view of the machine (Fig. 4). The sides of the fuselage are held together at the forward end by Angle Brackets and Trunnions, and at the rear by $1'' \times 1''$ Angle Brackets bolted to the $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plate forming the tail plane. A $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip serves the dual purpose of strengthening the sides and supporting the $3\frac{1}{2}''$ Strips that are secured to the upper Trunnions at the front of the fuselage.

The main plane is built up of three $5\frac{1}{2}'' \times 3\frac{1}{2}''$ Flat Plates bolted together and strengthened by two $12\frac{1}{2}''$ Strips overlapped and secured to the leading edge of the plane. The wings are extended by means of $2\frac{1}{2}''$ Strips, which are held rigid by $2\frac{1}{2}''$ Strips bolted across their ends.

Curved Strips are secured across the ends of the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plate forming the tail plane, and the "fin," which consists of three Flat Girders, is secured to the tail plane by three Angle Brackets. In order to mount the "fin" centrally it will be found necessary to space it from the Brackets by Washers.

The following parts are required for the

model: 6 of No. 1; 2 of No. 1b; 6 of No. 2; 4 of No. 2a; 12 of No. 3; 6 of No. 4; 17 of No. 5; 2 of No. 6; 5 of No. 6a; 6 of No. 10; 2 of No. 11; 11 of No. 12; 2 of No. 12a; 1 of No. 16a; 2 of No. 20a; 106 of No. 37; 6 of No. 37a; 8 of No. 38; 2 of No. 4; 1 of No. 48; 2 of No. 48a; 3 of No. 52a; 1 of No. 59; 2 of No. 62; 1 of No. 70; 2 of No. 90a; 3 of No. 103f; 2 of No. 111; 2 of No. 111c; 2 of No. 126.

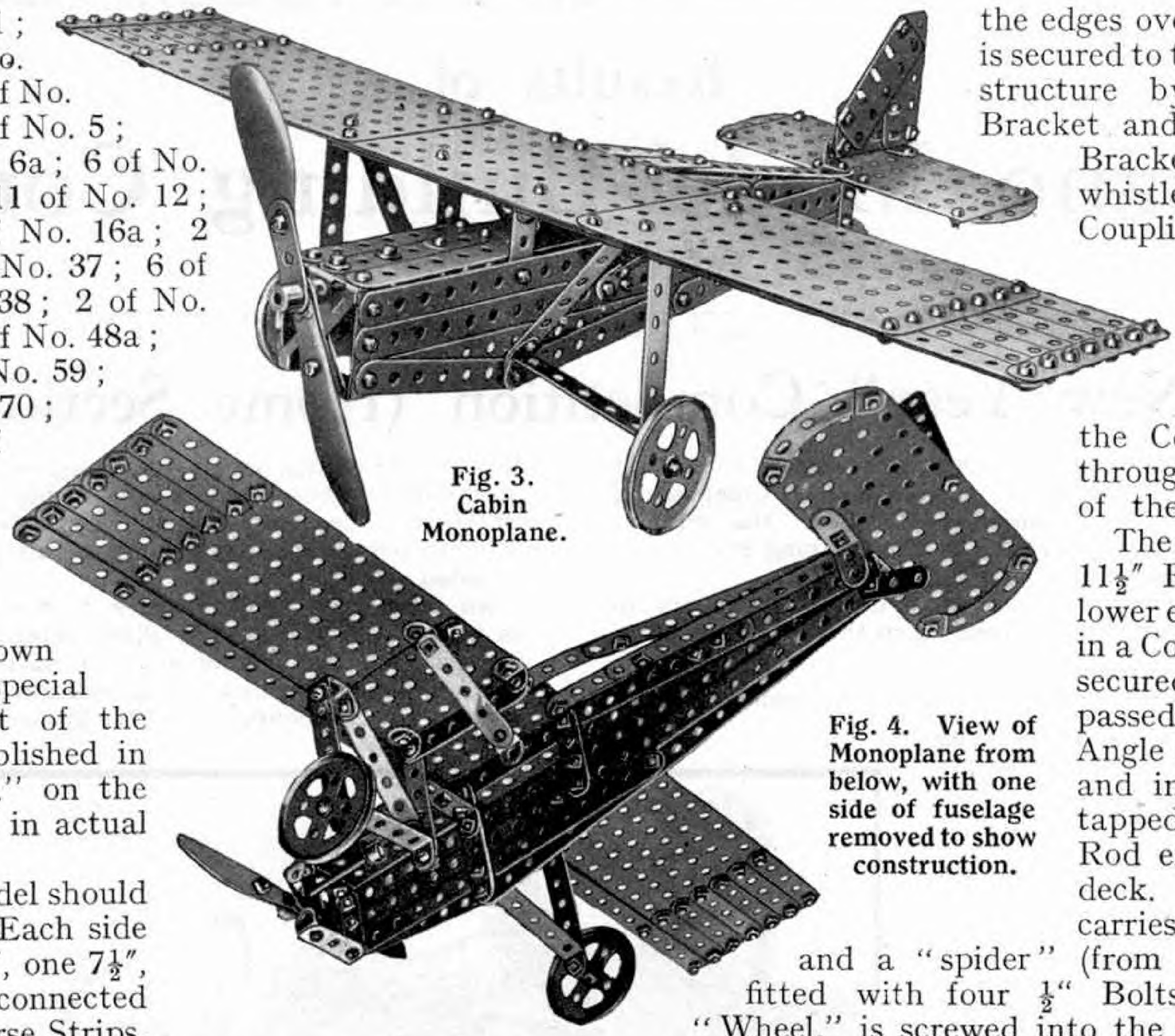


Fig. 3. Cabin Monoplane.

Fig. 4. View of Monoplane from below, with one side of fuselage removed to show construction.

Steam Tugboat

The model Tug shown in Fig. 6 will be of special interest on account of the article that was published in last month's *"M.M."* on the work of the tugboat in actual practice.

The hull of the model should be assembled first. Each side comprises seven $12\frac{1}{2}''$, one $7\frac{1}{2}''$, and two $3\frac{1}{2}''$ Strips connected by means of transverse Strips. At the bows, the sides are secured together by three Angle Brackets, Strips being employed for spacing them apart amidships. A view of the underside of the model appears in Fig. 5, and from this the arrangement of the spacing members can be seen clearly. The stern consists of $5\frac{1}{2}''$ Strips curved and joined together by $2\frac{1}{2}''$ Strips.

Each side of the superstructure comprises a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate and a $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plate bolted end to end with a $7\frac{1}{2}''$ Strip secured along the bottom. A $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plate is bolted across the end flanges of the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates at the rear end, and a $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate and two $3\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips are secured at the forward end of the superstructure.

The funnel is formed from ten $5\frac{1}{2}''$ Strips bolted to a Boiler (part No. 162) which is compressed so that the edges overlap three holes. It is secured to the deck of the superstructure by a $1'' \times 1''$ Angle Bracket and two $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets. The steam whistle is formed by a Coupling held to the funnel by a bolt screwed into its centre tapped hole. The steam pipe is represented by a Rod secured in the Coupling and passed through a hole in the deck of the superstructure.

The mast consists of an $11\frac{1}{2}''$ Rod extended at its lower end by a $4\frac{1}{2}''$ Rod held in a Coupling. The latter is secured by means of a bolt passed through the $5\frac{1}{2}''$ Angle Girder of the bridge and inserted in its lower tapped hole, while the $4\frac{1}{2}''$ Rod enters a hole in the deck. A $\frac{1}{2}''$ Bolt that carries a $1''$ loose Pulley (from a Swivel Bearing), and a "spider" fitted with four $\frac{1}{2}''$ Bolts to represent the "Wheel," is screwed into the Coupling.

The following is a list of parts contained in the model tugboat: 14 of No. 1; 2 of No. 1a; 5 of No. 1b; 24 of No. 2; 4 of No. 2a; 15 of No. 3; 12 of No. 4; 17 of No. 5; 3 of No. 6; 12 of No. 6a; 2 of No. 8b; 8 of No. 9; 6 of No. 9d; 4 of No. 9f; 10 of No. 10; 26 of No. 12; 4 of No. 12a; 1 of No. 13; 1 of No. 15; 1 of No. 15a; 4 of No. 17; 4 of No. 18a; 1 of No. 18b; 1 of No. 22a; 3 of No. 35; 314 of No. 37; 5 of No. 38; 1 of No. 40; 2 of No. 48; 6 of No. 48b; 2 of No. 52; 4 of No. 52a; 2 of No. 53; 4 of No. 53a; 6 of No. 59; 2 of No. 62; 2 of No. 62b; 6 of No. 63; 2 of No. 70; 2 of No. 72; 1 of No. 76; 2 of No. 90; 1 of No. 102; 2 of No. 103a; 2 of No. 103f; 1 of No. 103h; 5 of No. 111a; 1 of No. 162b; 1 of No. 165.

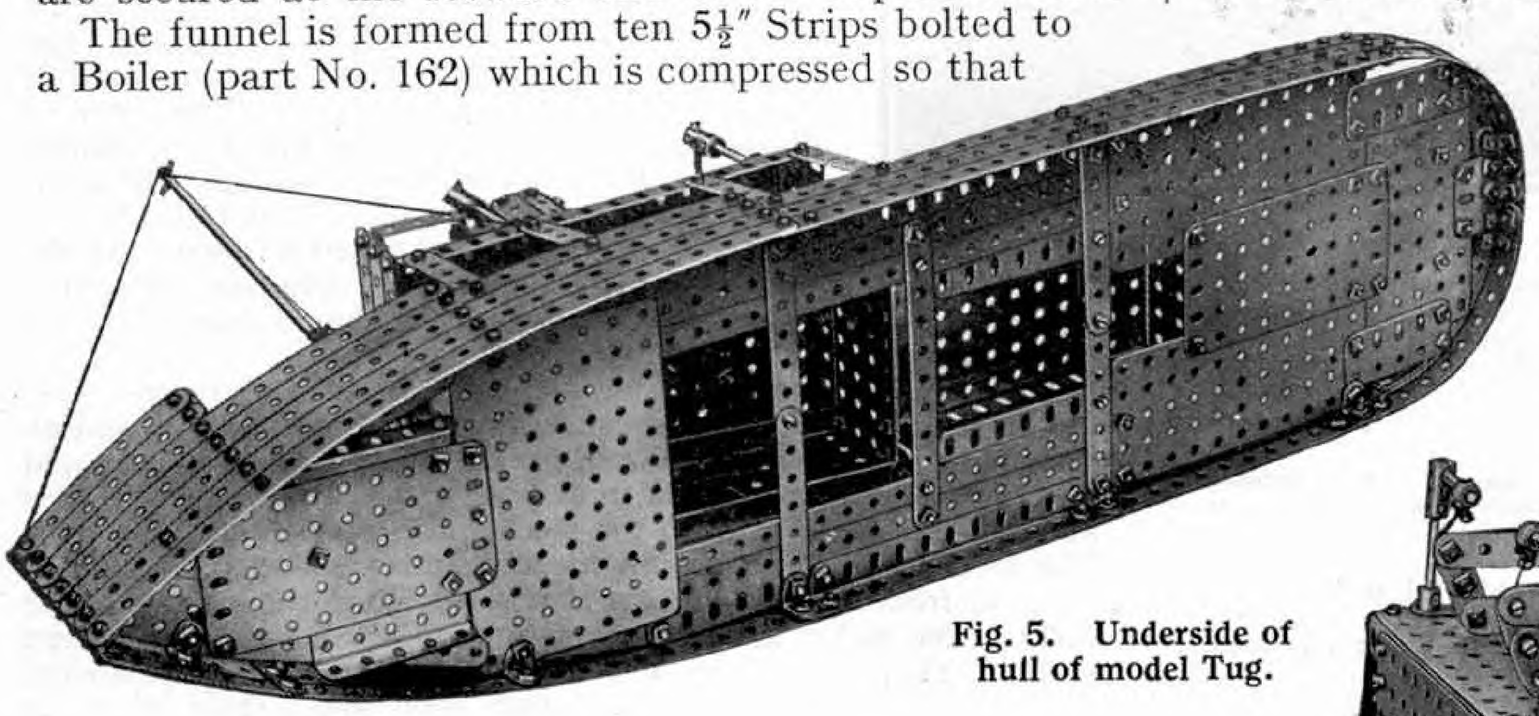


Fig. 5. Underside of hull of model Tug.

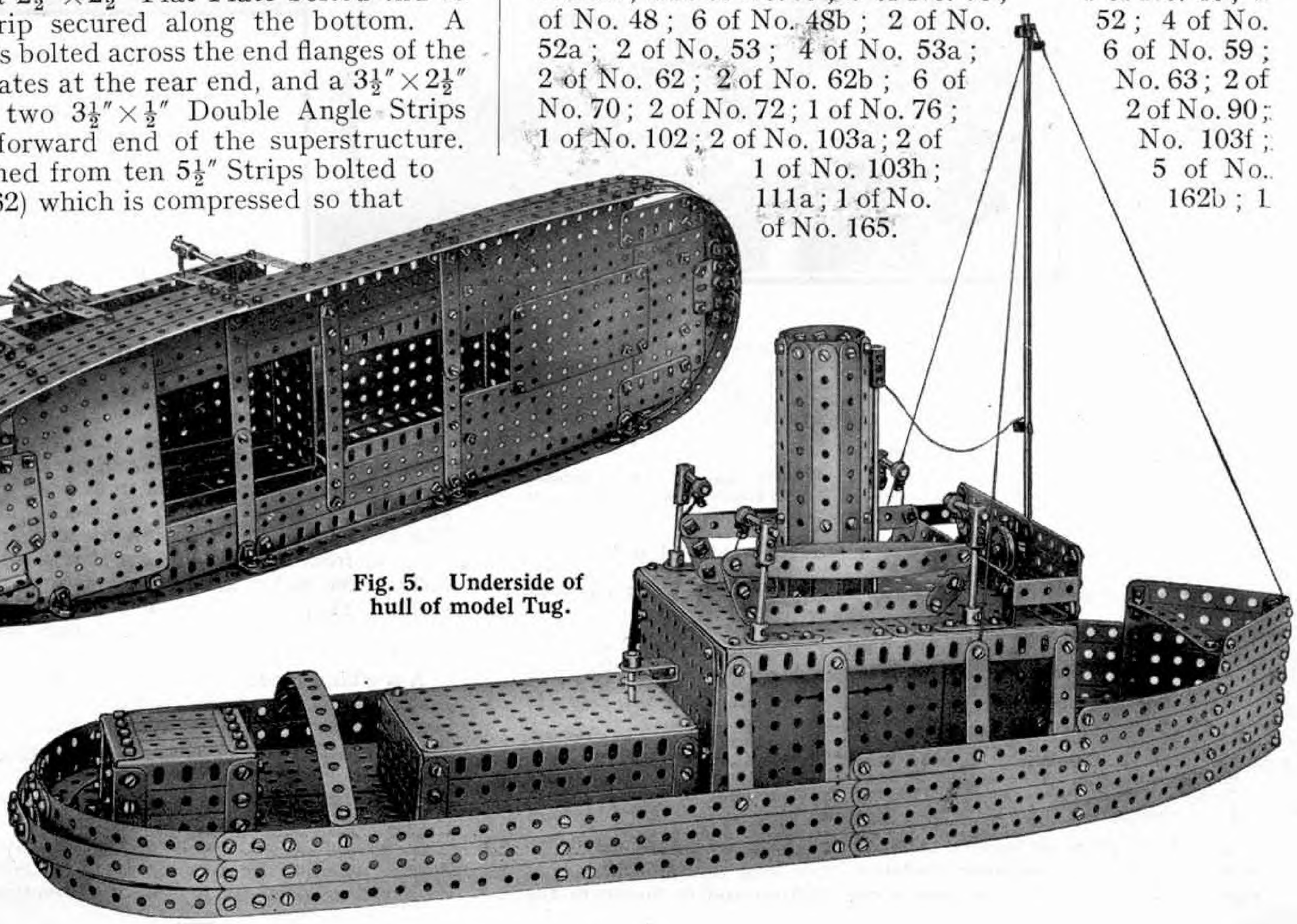


Fig. 6. (Right). General view of the model Tug, showing the bridge and deck fittings, etc.

Results of Meccano Model-Building Contests

By Frank Hornby

"New Year" Competition (Home Sections)

A GLANCE at the accompanying photographs will show that the entries in the "New Year" Model-building Competition were of a very high standard. Moreover, the number received broke all records, so that the task of making the awards was by no means an easy one.

The following list gives the names of the prize-winners in Sections A and B (for competitors residing in the British Isles).

Section A (competitors over 14 years of age)

FIRST PRIZE, cheque for £3-3s.: S. Bentley, Bingley, near Bradford. SECOND PRIZE, cheque for £2-2s.: F. K. Hardcastle, Davenport, Cheshire.

THREE PRIZES, each consisting of a Meccano Crystal Radio Set complete with Double Headphones: C. H. Harrison, Blackpool; John W. Percivall, Birmingham; D. Vickers, Preston.

SIX PRIZES, each consisting of Meccano products to value 10/6: E. Whalley, Blackburn; S. G. Smith, Edinburgh; A. J. Stewart, London, N.W.6; E. G. Rawlings, Holloway, N.7; E. Campbell, Castledermot, Co. Kildare; Albert Jones, Cinderford.

TWELVE PRIZES, each consisting of Meccano products to value 5/-: R. J. Mason, Newcastle; K. G. Budden, Southsea; E. H. Bradshaw, Sheffield; R. F. Nicholas, Portsmouth; J. F. Balchin, Hastings; A. A. Wiseman, Haverhill; A. H. Norris, Jesmond, Newcastle-on-Tyne; H. Northwood, St. Leonards; R. C. Randall, St. Albans; B. Unné, Harrogate; C. Bennett, St. Helver, Jersey; W. V. Bradbury, Tunbridge Wells.

TWELVE PRIZES, each consisting of an Engineers' Pocket Book: G. Bowley, Barrow-on-Soar; A. C. Rose, Birmingham; J. Redman, London, S.E.18; R. H. Turpin, Parkstone; C. W. Burdekin, Bournemouth; R. Lewis, Lurgan, Co. Armagh; P. Lyth, Newcastle-under-Lyme; A. E. Alexander, Swallowfield, Berks.; W. Lee, Gillingham; E. Whatley, Manchester; E. A. F. Holmes, London, W.1; C. Wrayford, Teigngrace, near Newton Abbot.

SPECIALLY COMMENDED (Certificate of Merit): L. Hollyoak, Coventry; J. Taylor, Chilworth, Guildford; T. Sergeant, Ghyll, Triangle; D. Cowley, Northampton; C. L. Coombes, Alnwick; A. Shattock, Northampton; James H. Moonie, Aberdeen; F. Williams, Rock Ferry; S. Mark, Seafield, Leith; J. R. Quine, Hull; P. Blaylock, Falkirk; Ian McThorburn, Helensburgh.

Section B (competitors under 14 years of age)

FIRST PRIZE, Meccano products to value £2-2s.: John William Rowney, Gateshead. SECOND PRIZE, Meccano Crystal Radio Set and Double Headphones: G. McLaurin Brown, Handforth. THIRD PRIZE: Meccano products to value 10/6: G. Gill, Folkestone, Kent.

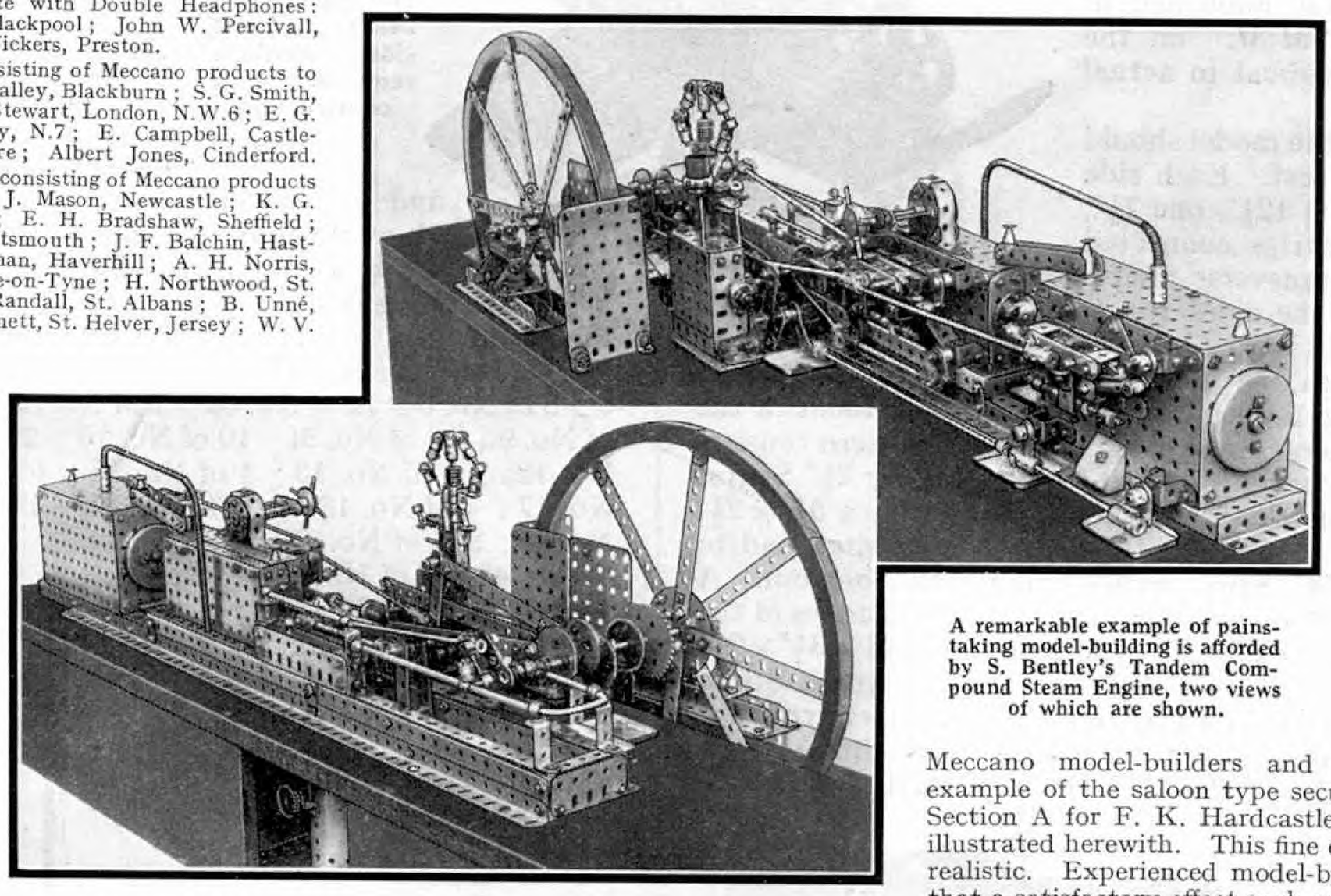
SIX PRIZES, Meccano products to value 5/-: T. Hartley, Keighley; J. W. Robertson, Goginan, near Aberystwyth; R. Johnstone, Birkenhead; W. E. Cocks, London, N.W.11; C. John Bassett, Keyham, Devonport; Kenneth Vickery, Peverell, Plymouth.

TWELVE PRIZES, each consisting of an Engineers' Pocket Book: L. John Stone, London, S.E.9; J. T. Lovett-Turner, Blockley; L. Herbert Davies, Brighton; R. Ward, Leicester; M. Hutchings, Frodsham; F. Stobbart, Lemington-on-Tyne; J. W. Davis, Milford Haven; H. H. Crook, Ashton-in-Makerfield; R. C. Watts, Hockley Heath; S. Gellis, Norwich; L. V. Roope, London, E.16; H. Love, Belfast.

SPECIALLY COMMENDED (Certificate of Merit): J. Erskine, Paisley; D. Winder, Liverpool; L. C. Warshaw, London, N.W.2; Percy G. Lindsell and Leslie E. Smith, Salvington, near Worthing; G. C. Walker, Teignmouth; S. Williams, Derby; Harry Cunliffe, Harrow, Middlesex; C. Riddiough, Wadsworth; J. Bonn, Paddington; John B. Jermyn, Blackrock.

The First Prize in Section A was carried off by S. Bentley with one of the most interesting models I have seen for some time. It represents a tandem compound steam engine and is shown in the illustrations on this page. It is equipped with Corliss pattern valve gear, which works remarkably well, the admission valves "tipping off" just at the right moment. The valve gear is under the control of a centrifugal governor, and an air pump and condenser are included.

An interesting point attaches to the built-up flywheel, which, as will be seen from the illustration, is composed of Channel Segments bolted together in the usual manner. When the model was completed, the flywheel proved too light to ensure satisfactory running, so Mr. Bentley filled the grooves of the Channel Segments with concrete and then enamelled the rim. The result was a very efficient wheel, and a free-running engine. Evidently this competitor has an abundance of good ideas, for he found a good use even for the lids of the Meccano Nut and Bolt tins. These he has employed as drip trays to catch the oil-drops from the crankshaft journals!



A remarkable example of painstaking model-building is afforded by S. Bentley's Tandem Compound Steam Engine, two views of which are shown.

Motor cars are always favourite subjects with Meccano model-builders and a specially fine example of the saloon type secured an award in Section A for F. K. Hardcastle, whose model is illustrated herewith. This fine effort is strikingly realistic. Experienced model-builders will know that a satisfactory effect such as that obtained in this model cannot be achieved by slip-shod constructional methods. Perhaps the windows are a little on the small side but this is only a very minor fault and one which is more than balanced by the neat construction of the whole car.

The chassis is complete with a three speed and reverse gear box, internal expanding rear wheel brakes, clutch and differential. Cantilever springing is employed for the rear wheel suspension and semi-elliptic springs for the front wheels. Ackermann steering is another important point in the mechanical features of the chassis. The model is driven from an Electric Motor operated by current supplied from an Accumulator that is carried in the interior of the body. The latter is complete with dashboard and bucket type seating, etc., and other details include hinged doors, sloping windscreen, turret ventilator, domed roof, and a host of minor features such as step mats, spotlight, number plates, etc.

A working model of an electric railway car was entered by C. H. Harrison. The interior is lighted electrically and the model is propelled by a Meccano Electric Motor, which is fitted under the main frames. Both bogies of the car are driven by means of gears carried on Rods extending from the centrally located Motor. A well-built miniature model of the famous flying boat, the DO.X., comprised the entry from J. W. Percivall.

D. Vickers submitted a model pile driver that he copied from an actual machine he saw at work recently. The "monkey," or hammer, is lifted by means of an endless Sprocket Chain, which

runs off a 1″ Sprocket Wheel that is driven from a gear box. The Chain is directed round the pile frame by means of four Flanged Wheels, and the model is driven by a Meccano Steam Engine.

Eric Whalley, who has achieved distinction in model-building on several previous occasions, struck a rather original note in choosing the subject of his entry. He submitted a model of the Bristol "Cherub" aero engine, which was illustrated in the September, 1929, issue of the "*M.M.*" Those readers who are able to refer to the issue in question will find that the engine is of the horizontal twin-cylinder type. In the model, the crankcase is formed from Circular Plates, to which a number of Flat Plates are bolted. In the upper portion of the crankcase is located the camshaft and part of the rocker gear for operating the valves. Each cam is formed from a Bush Wheel, to the face side of which a Collar is bolted to form the striker. The drive from the crankshaft to the camshaft gives a ratio of 2 : 1, which is obtained by the use of a ¾″ Pinion meshing with a 50-teeth Gear Wheel. From the shaft of the 50-teeth Gear Wheel a 1 : 1 ratio sprocket chain drive is taken to the overhead camshaft.

Ingenious use has been made of 2″ Pulley Wheels to represent the valve heads, while the valve seats are represented by Wheel Flanges inside which the 2″ Pulleys make a neat working fit. A workable "magnet" fitted on the engine has four "contact breakers" which are arranged to alternately make and break electrical contact in the negative lead from an Accumulator. When the contact is made the "magnet" sparks two plugs, which are represented by flash lamp bulbs, there being two bulbs to each cylinder.

Among other interesting items the model is fitted with a reproduction of a Zenith carburetter complete with float, oil pumps, and counterbalance weights on the crankshaft. The entire model is driven by a concealed 6-volt Meccano Motor.

In Section B, J. W. Rowney took First Prize with a model of an eight-reel planetary type wire rope-making machine. Unfortunately, the photographs submitted are not clear enough for reproduction, otherwise I would have liked to illustrate the model, for I feel sure it would interest all Meccano model-builders.

The Second Prize in this section was awarded for a very unusual type of model—a collapsible caravan! No doubt, many of our readers will be familiar with vehicles of this kind, for they are becoming very popular, for purposes of summer "camping-out." They are known as shadow caravans, and in outward appearance they resemble very much an ordinary caravan of the well known gipsy type, but they differ considerably in actual construction.

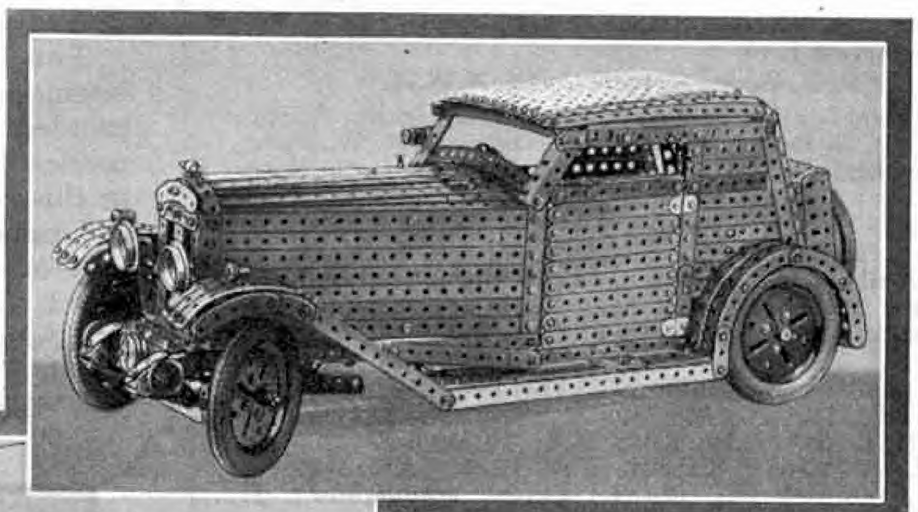
The structure is in two halves, the upper half being slidable, so that it may be lowered down to form a compact wagon, which may be hitched to a motor car and towed along. Mechanism is provided by means of which it is possible to raise or lower the upper portion by turning a handle. The model, which was built by G. McLaurin Brown, runs on two wheels, and is provided with four hinged "legs" which fold underneath the body during transportation. In the illustration the model is shown in position ready for occupation. The top half of the van slides on four vertical Rods, two of which are placed at each end of the van (the tops of these Rods can just be seen in the photo). The movable half may be raised or lowered simply by turning a handle, which operates two Screwed Rods that engage Threaded Couplings fixed to the frame of the top half of the van. As the Screwed Rods are rotated the Couplings move upward or downward, according to the direction in which the Screwed Rods are turned.

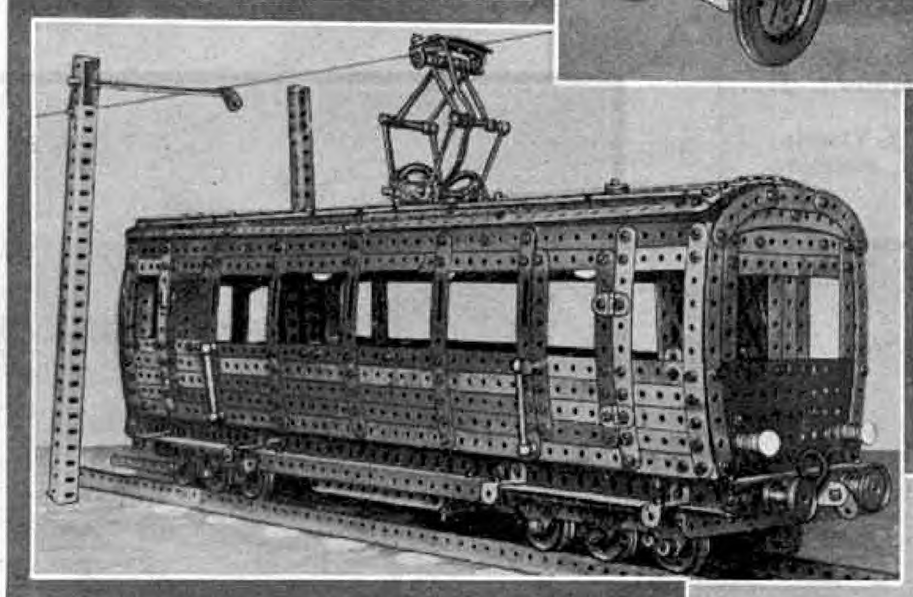
A very pleasing model of a fully rigged sailing ship comprised the entry from G. Gill. It is shown in one of the illustrations herewith.

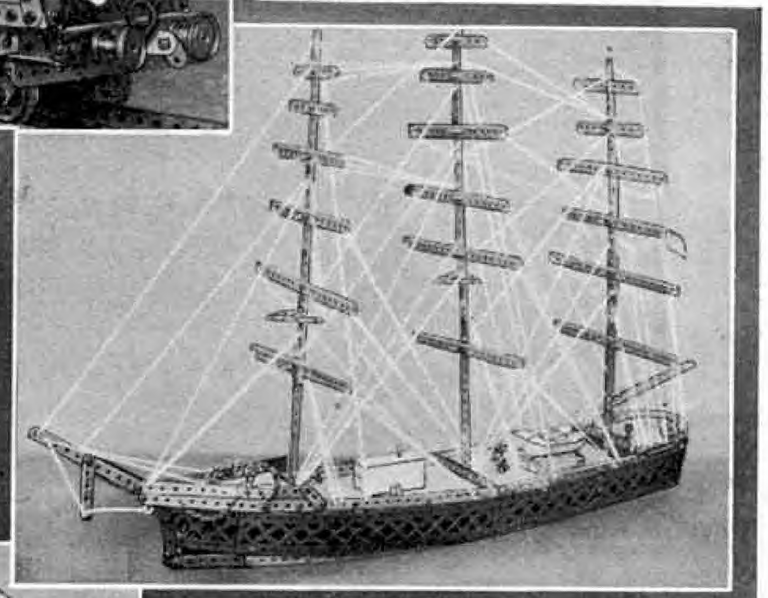
A large number of models of agricultural implements are generally to be found amongst the entries in a model-building contest and the "New Year" Competition proved no exception to the rule. One entry I noted particularly is that from Raymond Johnstone, who submitted a cleverly designed replica of an agricultural seed-sowing drill. This is an interesting machine devised for planting seeds over large areas.

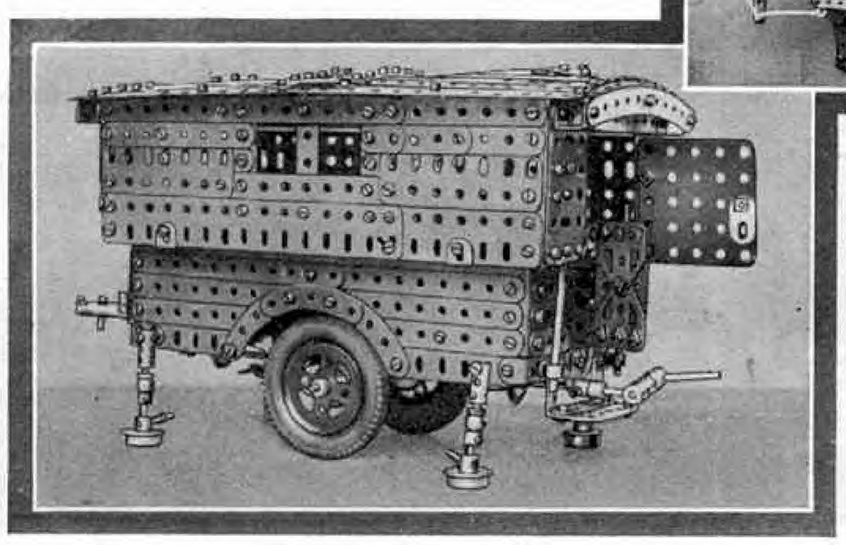
In the prototype of Johnstone's model the body of the machine is carried on two large driving wheels, and an independent fore-carriage is provided by means of which the operator may steer the machine, and thus avoid irregularities in the sowing. The seeds are carried in a hopper at the top of the casing, from which they pass through adjustable doors into a trough. Above this trough is a horizontal shaft, driven by gearing from one of the travelling wheels, and having on it five discs which are provided with metal cups. As the discs revolve the cups dip into the seeds and raise them somewhat in the same manner as the ancient Persian water wheels raised water. On both sides of each disc are spouts into which the seeds drop before passing down a funnel or "drill" to a groove formed in the soil by a rake, or "coulter," as it is termed. The depth of sowing can be readily altered by raising or lowering the coulter from the ground, this operation being carried out from a windlass, located at the rear of the machine. A lever also is provided for throwing the seed-sowing mechanism out of gear when the machine is travelling to or from work.

Other meritorious entries in Section B are a dragline by C. J. Bassett, hammerhead crane by K. Vickery, a well-built motor omnibus by W. E. Cocks, and a realistic model of a commercial motor lorry entered by Thomas E. Hartley. J. W. Robertson submitted a miniature model motor cycle and sidecar which embodies excellent detail work.









Four excellent prize-winning entries from the "New Year" Contest. They are as follows: F. K. Hardcastle's Saloon Motor Car; an Electric Railway Coach by C. H. Harrison; G. Gill's fully-rigged Sailing Ship; and an interesting model of a "Shadow" Caravan by G. McLaurin Brown.

Interesting Model Contest at Sutton

Many Meccano agents in various parts of the country make a practice of organising model-building competitions for the benefit of local Meccano enthusiasts. One of the most recent contests to come to our notice is that held by William Pile Ltd., 46-50, High Street, Sutton. The quantity of entries received was very encouraging. Prizes were awarded as follows:—

Section A (for boys 5 to 8 years old). First Prize, value 10/–: F. Randell (awarded for a model two-seater Motor Car). Second Prize, value 5/–: K. Plissert (Swivel Crane).

Section B (for boys 9 to 12 years old). First Prize, value 15/–: A. P. Smallman (Derrick Crane). Second Prize, value 7/6: A. C. Green (Crane).

Section C (for boys 13 to 15 years old). First Prize, value 20/–. J. C. Bulstrode (Lifting Bridge). Second Prize, value 10/–: L. Libaert (Tower Bridge).

Results of Meccano Model-Building Contests—(*Continued*)

"Christmas" Model-Building Competition (Home Sections)

The Home Sections of this contest produced a splendid collection of original and well-built models. Practically every branch of engineering is represented amongst the entries received.

Prizes have been awarded in the Home Sections as follows:

Section A (for competitors over 14 years of age)

FIRST PRIZE, cheque for £3-3s.: F. Miller, Oldham. SECOND PRIZE, cheque for £2-2s.: R. Kirkham, Elworth, Sandbach. THIRD PRIZE, cheque for £1-1s.: Rev. John Carpenter, Lewisham, S.E.13.

SPECIAL PRIZE, cheque for £1-1s.: F. E. Cocks, Golders Green, N.W.11.

SIX PRIZES, each consisting of a Real Leather Pocket Wallet: Alban Smith, Wigan; Edgar Whatley, Manchester; P. D. Pearse, Kingston-on-Thames; R. W. Blake, St. Margarets-on-Thames, Twickenham; G. A. Doksey, Liverpool; Leslie Hope, Weston-super-Mare.

TWELVE PRIZES, each consisting of Meccano products to value 5/–: James Huson, London, S.E.19; R. N. Tilley, Chelmsford; A. Marshall, London, N.21; A. W. Cooper, Southampton; N. Hulbert, Trowbridge; James Burwell, Brentford; M. V. Brockhurst, Whyteleafe, Surrey; Martin Agar, Clifton, Bristol; G. W. Green, Keighley; A. G. Walmsley, Haverhill, Suffolk; S. G. Smith, Edinburgh; W. H. Crowhurst, Surbiton.

TWELVE PRIZES, each consisting of a Meccano Engineers' Pocket Book: E. Campbell, Castledermot, Co. Kildare; J. H. Allan, Kendal; Robert Philip, Brechin, Angus; R. J. Thompson, Norwich; H. E. Bailey, Highgate, N.6; H. McClean, Dublin; R. Ferrier, London, W.6; R. H. Panther, Dalston, E.8; L. A. Jones, London, S.W.16; J. Hazell, Hartley, Wintney; R. Michael Latter, Wallingford; T. Abercrombie, London, N.W.10.

SPECIALLY COMMENDED (Certificate of Merit): P. D. Banks, Dunstable; J. Thompson, Manchester; J. Ryan, Dublin; A. L. Hampson, Widnes; L. A. Balchin, Dunstable; E. Humphries, Walthamstow, E.17; R. H. Culvert, Beare Green, Surrey; G. Symonds, Godalming; R. P. Baker, South Wigston; D. Young, West Croydon; E. Hobbyn, Lewes.

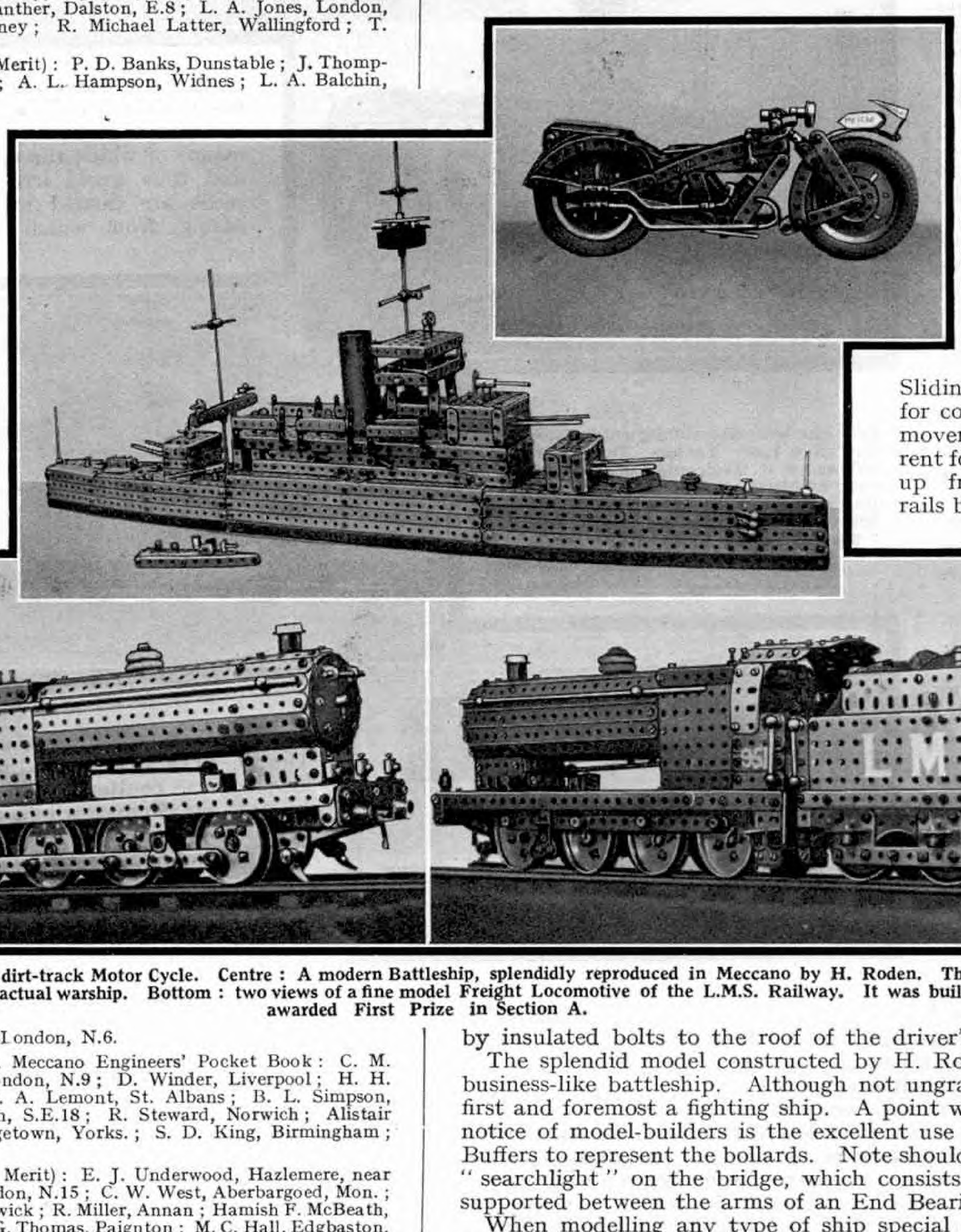
Section B (for competitors under 14 years of age)

FIRST PRIZE, Meccano products to value £2-2s.: H. Roden, Kilmacolm; SECOND PRIZE, Meccano products to value £1-1s.: J. Robson, Scarborough. THIRD PRIZE, Meccano products to value 10/6: G. Mitsotakis and J. N. Bailey (joint award), Kingston Hill.

SIX PRIZES, each consisting of Meccano products to value 5/–: Albert Blackburn, Kelvedon; K. Haigh, Warmsworth; Q. R. Purser, Abberton; Douglas Cavill, Swinton; Lawrence Smith, Norwich; Peter Jones, Highgate, London, N.6.

TWELVE PRIZES, each consisting of a Meccano Engineers' Pocket Book: C. M. Sinclair, Edinburgh; C. Gillett, London, N.9; D. Winder, Liverpool; H. H. Lewis, Pontypool Road, Mon.; D. A. Lemont, St. Albans; B. L. Simpson, London, S.W.5; S. Ralph, London, S.E.18; R. Steward, Norwich; Alistair I. Petrie, Perth; P. Davies, Grangetown, Yorks.; S. D. King, Birmingham; E. Ambler, Gillingham.

SPECIALLY COMMENDED (Certificate of Merit): E. J. Underwood, Hazlemere, near High Wycombe; A. G. Woods, London, N.15; C. W. West, Aberbargoed, Mon.; L. J. Coe, Ipswich; F. H. Leigh, Keswick; R. Miller, Annan; Hamish F. McBeath, Angus; R. Q. Stevens, St. Ives; M. G. Thomas, Paignton; M. C. Hall, Edgbaston, Birmingham.



Top: R. N. Tilley's neatly constructed dirt-track Motor Cycle. Centre: A modern Battleship, splendidly reproduced in Meccano by H. Roden. The model possesses all the important constructional features of an actual warship. Bottom: two views of a fine model Freight Locomotive of the L.M.S. Railway. It was built by Fred Miller and was awarded First Prize in Section A.

F. Miller's model represents one of the latest L.M.S. 0–8–0 standard freight locomotives. He has gone to considerable pains to reproduce as exactly as possible the between-frame cranks and connecting rods, which are an important feature in the mechanism of the actual engine. The tender of the locomotive is used to house a six-volt Accumulator, which drives the Electric Motor by which the engine is operated. The current supply for the motor is picked up from a centre rail by means of a Collecting Shoe, from which insulated wires connect with the terminals of the Motor.

The second Prize in Section A was awarded to Reginald Kirkham for a particularly original type of model. It consists of a modern detached bungalow, complete with railed-in gardens and outhouses. The model is of such unusual interest that I have decided to illustrate and describe it fully in a special architectural article that will appear as soon as possible in the "*M.M.*"

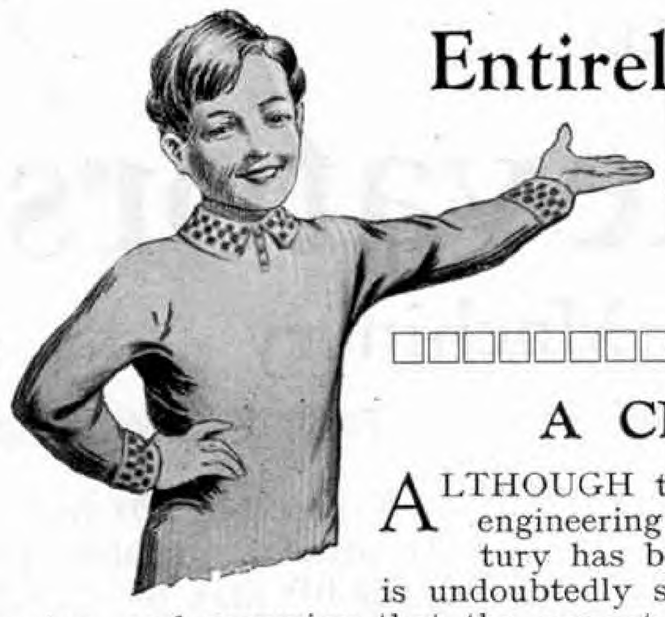
The Rev. John Carpenter's model is a simple yet very efficient harmonograph. It was built for use at a local sale-of-work, where, incidentally, it was the means of raising a quite considerable sum of money for charitable purposes, and it was entered for participation in this competition at the request of Meccano Limited. The model differs considerably from the Meccano Harmonograph described in Instruction Leaflet No. 26, for it employs two separate pendulums, which may be arranged to swing at any angle to each other. Their combined movements impart a series of oscillations—the variety of which is infinite—to the designing pencil, thus rendering exceedingly easy the production of innumerable beautiful designs.

The judges found it impossible to decide between the rival merits of this model and one entered by F. E. Cocks, and to overcome the difficulty they awarded a special prize of equal value to Mr. Cocks. The latter's model represents an electric telpher crane, and is one of considerable interest. Sliding gears are provided for controlling the various movements, and the current for the Motor is picked up from two conductor rails by collectors attached by insulated bolts to the roof of the driver's cabin.

The splendid model constructed by H. Roden is a thoroughly business-like battleship. Although not ungraceful in design it is first and foremost a fighting ship. A point worth bringing to the notice of model-builders is the excellent use Roden has made of Buffers to represent the bollards. Note should also be made of the "searchlight" on the bridge, which consists of a ½" fast Pulley supported between the arms of an End Bearing.

When modelling any type of ship special care should be paid to the funnels, which should be copied as closely as possible, for they form such conspicuous features of the model that errors in proportion or shape detract very greatly from an otherwise realistic effect. Roden seems to have been well aware of this point for it will be seen that he has secured excellent proportions by the expedient of compressing a Meccano Boiler to form the funnel.

Another model of a ship, but of a very different type, secured a prize for J. Robson. His entry represents a small ferry steam-boat, the bridge fittings of which include a binnacle and wheel.



Entirely New Meccano Model-Building Contest:

"Engineering of the Future"

A CHANCE FOR YOUTHFUL PROPHETS

ALTHOUGH the progress made in engineering during the past century has been very great, there is undoubtedly scope for still further extension, and assuming that the present rate of progress and invention continues, there is very little doubt that the year 2000 A.D. will see a vastly different civilisation to that which we know to-day. It is, of course, impossible to say what new principles will be developed by the engineers of the future, but it is probable that the results will be quite as startling to those who live to see them as the mechanical and electrical methods now in use would have been to our ancestors had they been able to visualize them.

The introduction of road coaches equipped with glass windows was considered very wonderful in the days of Charles II, while at a later period the substitution of stage coaches by railways was regarded as an absolute revolution, and the spread of the iron road was confidently expected to result in the complete decay of road travel. Eventually, however, there came the motor car, which made road travel more popular and universal than ever before!

Surprises of this kind are probably in store for the future also. No doubt aeroplanes will be so much improved that a flight round the world will be less exciting than a railway journey is to-day! What form will land transport take? Mono-rail cars may take the place of our present day two-rail coaches, and the passengers of the future possibly will examine the finest of our Pullman coaches reposing in their museums with feelings of surprise that human beings once actually travelled in what would seem to them unnecessarily cumbrous wagons that travelled at the absurdly slow speed of 60 miles per hour!

The engineers of the future will rule in agriculture and, indeed, in all phases of life. If steam and petrol engines still exist in the next century they will probably take forms that would be unrecognisable to the present generation. Ideas that would be new and startling to us will almost certainly be commonplace to the engineers of the future, who are the Meccano boys of to-day.

That Meccano boys have their own ideas on the matter was proved to us recently, when we received from an enthusiastic model-builder a splendid Meccano model of a weird and wonderful locomotive, which, according to the builder, will be in everyday use a hundred years hence. Needless to say the model differed greatly in appearance to the engines of to-day and we were so impressed by it that the thought occurred to us that it would be interesting to ascertain the ideas of other Meccano boys concerning engineering of the future. With this end in view therefore, we decided to organise a competition and to award a number of splendid prizes to the builders of the most ingenious and practical models representing a machine, aeroplane, locomotive, or any other engineering contrivance which in the opinion of the builders will be commonplace to the engineers of, say, 2000 A.D.

The contest is open to every owner of a Meccano Outfit. There are no entrance fees to be paid or forms to be filled in. In entering the contest competitors should give their imagination full rein and try to visualize engineering wonders as they will appear to the boys of the next century. Competitors may choose any type of model they like as the subject of their entry, and the more vivid the imaginative effort shown in designing models the better the chance of gaining a prize.

Actual models must not be sent. It is only necessary to submit either clear photographs or, if this is not possible, good drawings of models, together with a brief but concise explanation of any structural or mechanical features that are not easily apparent from the photos or drawings. Neither photographs nor drawings need be the competitor's own handiwork but it is absolutely essential that the model itself is his own unaided work.

Entries will be divided into three sections: Section A, for readers residing in the British Isles and over 14 years of age; Section B, for readers residing in the British Isles and under 14 years of age; Section C, for readers of all ages residing Overseas. Age will be taken into consideration when judging.

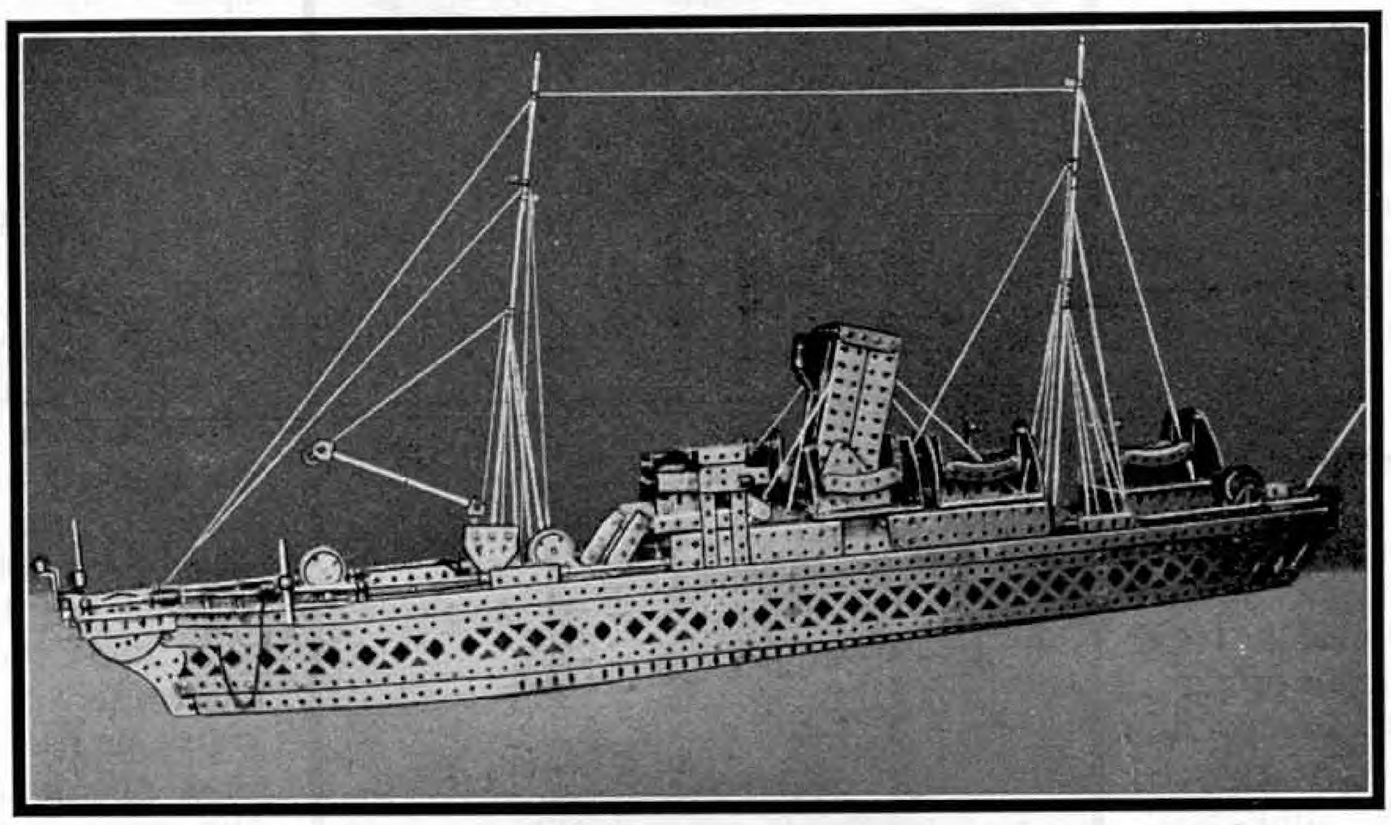
The prizes to be awarded in Sections A and C are as follows: First Prize: Cheque for two guineas; Second Prize: Cheque for one guinea. Third Prize: Cheque for half-a-guinea. Twelve Prizes, each consisting of Meccano products to value 5/–. Twelve Prizes, each consisting of a Meccano Engineers' Pocket Book.

The Prizes in Section B are as follows: First Prize: Meccano products to value two guineas. Second prize: Meccano products to value one guinea. Third Prize: Meccano products to value 10/6. Six Prizes, each consisting of Meccano products to value 5/–. Twelve Prizes, each consisting of a Meccano Engineers' Pocket Book.

The competitor's name, address, and age must be written clearly on the back of each photograph or drawing sent in, together with the letter (A, B, or C) indicating the Section for which the entry is eligible. Envelopes containing entries should be addressed "Engineering of the Future" Competition, Meccano Ltd., Binns Road, Old Swan, Liverpool. Photographs of prize-winning models become the property of Meccano Ltd., but unsuccessful entries will be returned to the senders provided a stamped addressed envelope of the requisite size is enclosed with the entry.

31st July, 1930, is the last day on which entries may be received in the Home Sections (A and B). Overseas readers must forward their entries so that they reach Liverpool not later than 30th September, 1930.

A REALISTIC MECCANO STEAM YACHT



This remarkable model of a steam yacht secured a prize in a recent Meccano Model-building Contest for Mr. L. W. Grey, of East Ham, London. Note the amount of detail in the deck fittings.

NEW MECCANO SUPER MODEL:

Warehouse with Elevators

An Imposing Example of Lifting Machinery

WITH the rapid development of our large cities and the corresponding rise in the value of building sites, economy in ground area has resulted in the erection of increasingly high buildings having a great number of floors. In such buildings the installation of passenger or goods lifts is necessary in order to render the upper floors easily accessible. These modern lifts are usually operated by electric motors, although there are some engineers who prefer to drive their lifts by hydraulic power or other means.

The hydraulically-operated lift is not met with so frequently, but in places where water under high pressure is readily obtainable it still holds its own against the electric type, especially if excessive loads have to be handled, because it is comparatively cheap in initial cost and upkeep. It is particularly suited for use where a lift is required to rise and fall through a short distance only.

In such cases it is usual to install the direct-ram machine, a device that consists essentially of a long cylinder containing a piston or ram, the whole being sunk into the ground beneath the lift well. The ram is attached directly to the underside of the lift cage, and the cylinder is fitted with valves so that water may be admitted at great pressure into the cylinder beneath the piston. The incoming water forces the ram and cage upward. To lower the lift it is only necessary to open the exhaust water valve on the cylinder and, the pressure being released gradually, the ram and cage descend by their own weight. The chief disadvantage of this system is, of course, the great length of cylinder and ram which would be required for a high building, and this is one of the reasons why the type is now but seldom employed. Another disadvantage lies in the fact that the long cylinder is liable to fracture or the pipes may burst under the great pressure.

Modern High-speed Lifts

Lifts hauling goods traffic usually travel at the comparatively slow speed of 120 feet per minute, but it is the practice to provide variable speed gears in order that, if required, the lift may be operated at a higher speed. In restaurants, large shops and offices, etc., where there are a number of lifts, they are usually arranged in batteries, some of the lifts running "express" or non-stop to certain of the higher floors and others running "local," or stopping at all floors. The express lifts will obviously be high speed machines; they usually travel at speeds up to 300 or 400 feet per minute. A speed of 150 to 180 feet per minute is usually chosen for the "local" lifts in order to avoid violent acceleration and deceleration.

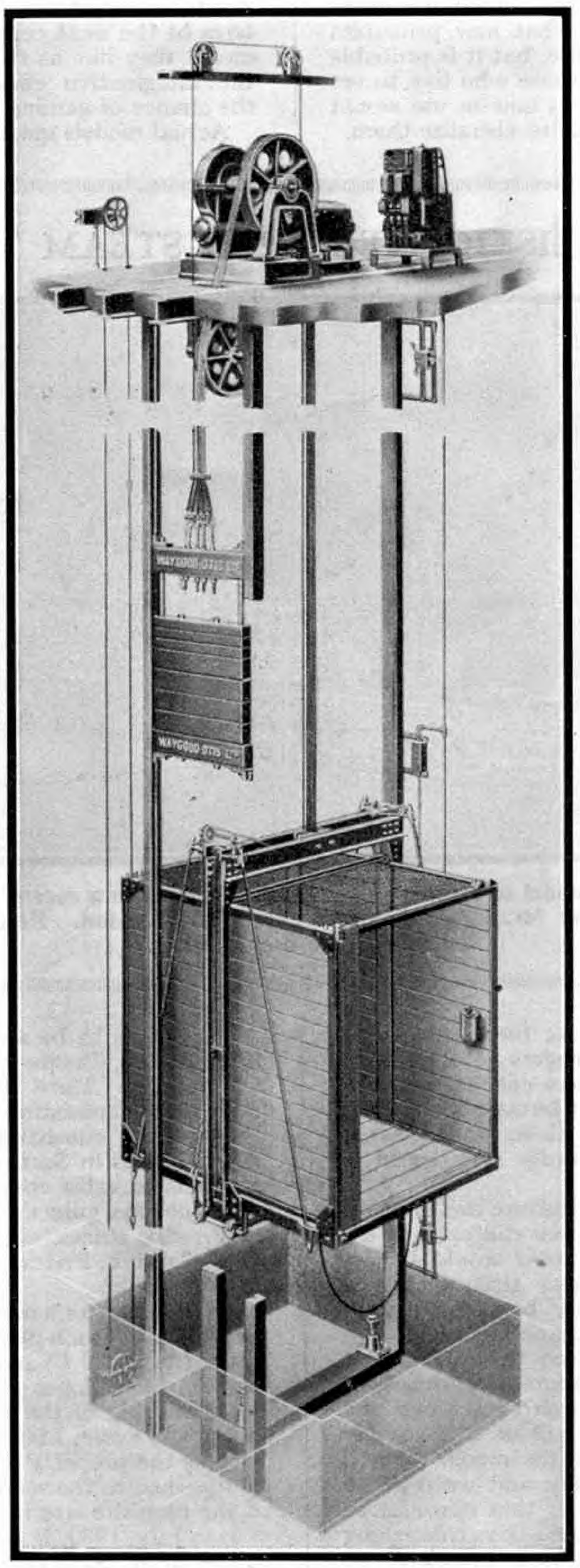


Fig. 1. This illustration of a modern Electrically-operated Goods Elevator provides an interesting comparison with the Meccano model shown in Fig. 2.

In designing any type of lift there are naturally many factors to be considered, one of the most important being the necessity for absolute safety. Also, when stopping at each floor, it is very desirable to be able to bring the lift from full speed to rest without jar or shock, and much attention has been given to this point during recent years.

In most modern lifts the cars are suspended by multiple-strand steel ropes, as past experience has proved that chains are unsatisfactory for the purpose. One of the great disadvantages of chain suspension is that a chain is liable to fail suddenly without giving any previous warning.

To prevent the cage falling in the event of failure of the hauling ropes a special safety gear is fitted. It is usually arranged either above or immediately beneath the cage. Different makers, of course, fit different types of safety gear and there are a great number of these ingenious mechanisms in everyday use.

One of the foremost British firms has designed a type of gear which consists essentially of four cams, mounted on steel shafts and suitably supported under the floor of the cage. The apparatus is operated by a separate "safety" rope that is directly attached to the camshafts and so designed that in the event of failure of the suspension ropes

(which are attached to the body of the cage) the four cams will be drawn in and will grip simultaneously on the steel guides between which the cage travels. This type of gear is fitted to the lift shown in Fig. 1. It is manufactured by Waygood-Otis Ltd., of London, one of the pioneer firms in the lift building industry.

This safety apparatus, while being quite efficient and reliable, has a disadvantage in that it acts rather suddenly and brings the cage to a standstill with a jerk. In view of this it is hardly suitable for use with high speed " express " passenger lifts and for such lifts a special type of gear has been devised by the same makers. It is brought into operation by a speed governor immediately the lift cage attains an excessive speed due to any failure in the brake machinery or of the wire lifting ropes. This form of safety device is arranged to come into operation gradually and stop the car without sudden shock or jerk—a feature which, as will be easily recognised, is absolutely essential in the case of a lift travelling at high speed.

The Lifting Machinery

The following are a few particulars of the mechanism supplied by Waygood-Otis Ltd. with their electric goods and passenger lifts.

The winding motor is directly coupled to a worm and wheel reduction gear. The worm, which is placed immediately below the wheel and arranged so that it will always be running in a bath of oil, is made of solid cut steel, while the wheel is of phosphor-bronze. They are enclosed in a special type of gear box.

To reduce wear and tear on the wheel teeth, ball thrust-bearings are fitted to take the thrust of the worm shaft. The main driven shaft is fitted with a hoisting drum of large diameter that has four grooves turned in its surface to take four stranded steel wire lifting ropes which are connected at one end to the " cage " and at the other end to a heavy counterbalance.

A powerful automatic magnetic brake is fitted and is arranged to engage with a drum that forms the outer portion of the coupling between the motor and the worm gearing. In the event of the electric current failing the brake instantly comes into operation and brings the cage to a standstill. In large lifts, two such brakes are fitted so as to ensure absolute safety.

The older types of lift or those intended for handling goods are often controlled by a hand rope led through the " cage " in a suitable position and connected to the switch or valve gear. In the case of the more elaborate lifts, however, where it is usual to employ a special attendant, the control is by means of a switch placed in the cage and fitted with a " self-centring " handle, the idea being that should the attendant release the handle inadvertently it will

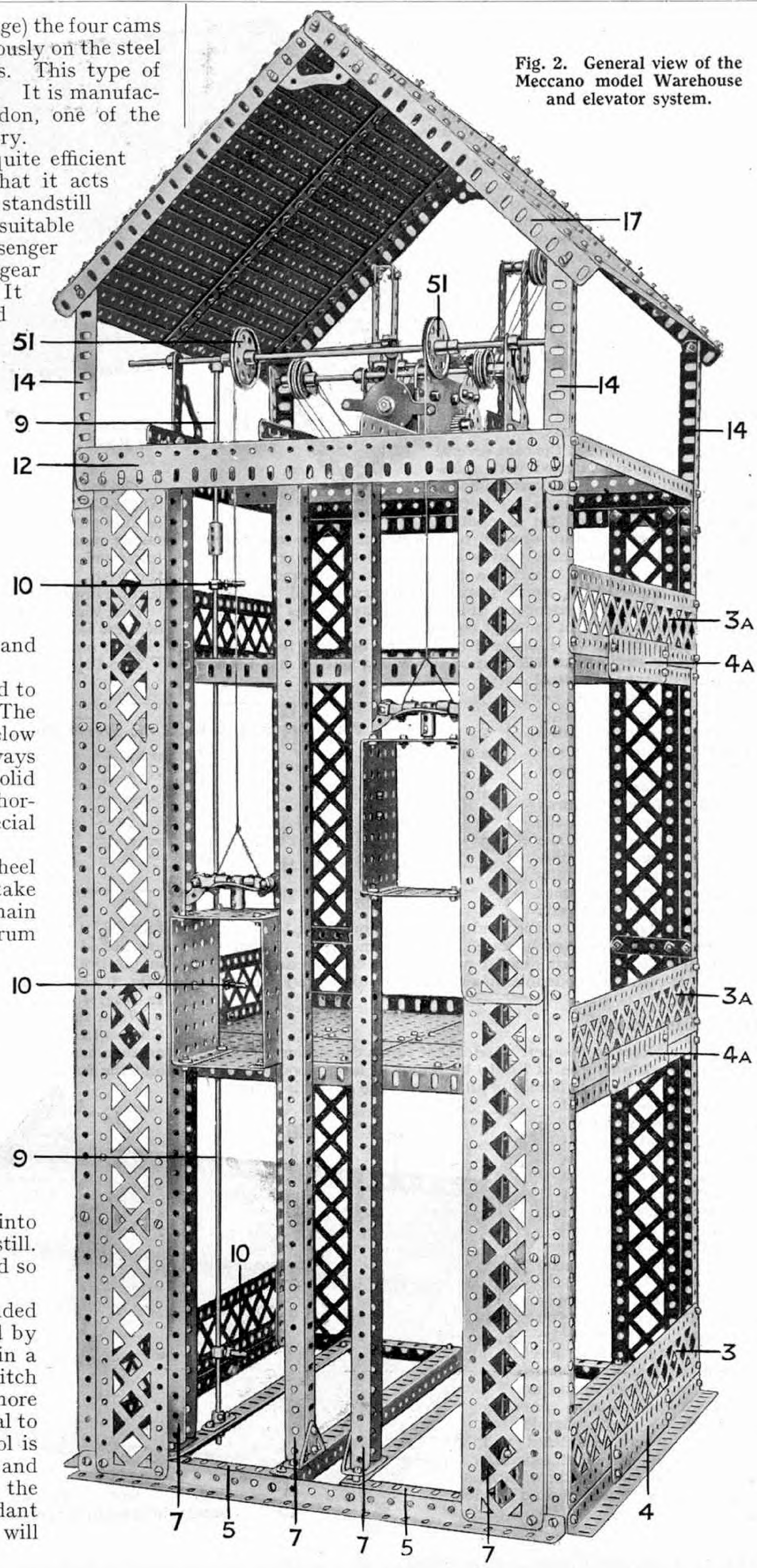


Fig. 2. General view of the Meccano model Warehouse and elevator system.

automatically take the " off " position.

In some cases, however, it is not possible to employ a special attendant to operate the lift and this fact has necessitated the invention of an automatic system, so that anyone can operate the lift as required. The automatic control system is used largely in lifts installed in warships and ocean liners, etc., as well as in office and hotel passenger lifts.

The system as fitted by Smith, Major, and Stevens Ltd., of Northampton, consists of a series of electric " push " buttons provided at each floor of the building. By pressing one of the buttons for an instant, the cage is brought to the particular floor at which the button is situated, where it stops automatically and unlocks the entrance door which, by the way, cannot be opened until the cage arrives. The intending passenger can now enter the cage, but to avoid accidents the electric circuit is so arranged that he cannot move the cage away until he has closed the lift and entrance doors.

The passenger finds in the cage several buttons which are marked with numbers to correspond to the various floors in the building. The required button is selected and pressed for a moment and the cage starts away upward or downward as the case may be. Immediately the cage moves away it relocks the entrance door it is leaving and continues to travel until it reaches the selected floor, when it again stops automatically and unlocks both doors, when the passenger is at liberty to leave. The " cage " is then at the disposal of the next comer.

It is usual to fix an additional button in the cage to enable the lift to be stopped at will in case the wrong button has been pressed. This type of control renders lift working extremely safe as a door cannot possibly be opened either from the inside or outside unless the cage is present at the floor level, and the cage cannot be moved away from a floor unless all the doors are closed. In the older lifts the cage sometimes " over-ran " the limits of its travel with consequent danger of damage not only to the cage itself but also to the winding gear. Nowadays, however, emergency electric switches operated by the ascending or descending lift are fitted at certain definite points in the cage pit and these render over-running impossible by switching off the electric supply to the motor.

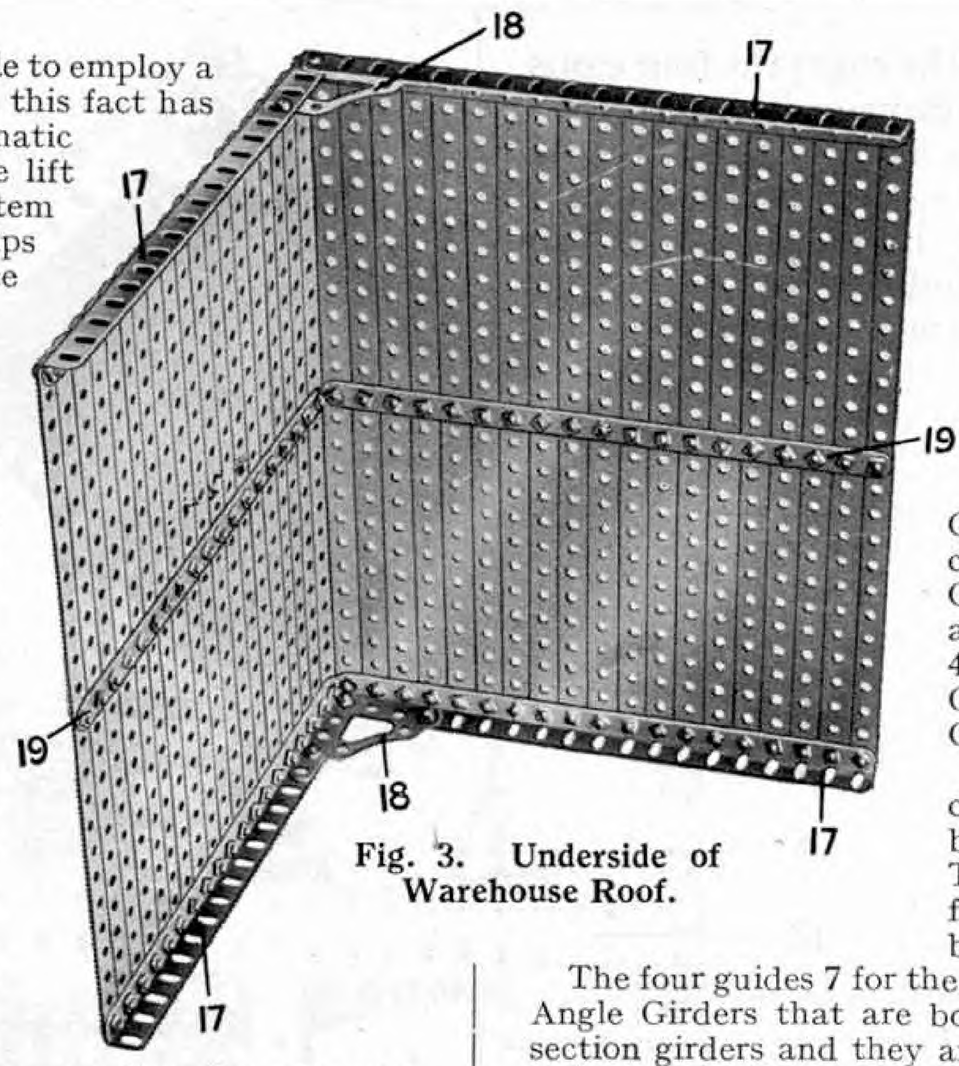


Fig. 3. Underside of Warehouse Roof.

The Meccano Model

The new Meccano "super" model that forms the subject of this article represents a type of lift to be found in large goods warehouses and industrial buildings of all kinds. The model is entirely automatic in action and the two cages will continue to ascend and descend alternately just as long as the electric supply is maintained. As in a real warehouse lift, a special type of safety device is fitted to each cage.

The lifting mechanism is operated by a 6-volt Meccano Electric Motor mounted at the top of the warehouse. It may be stopped or started from any of the floors in the warehouse. The lifting mechanism employed is particularly novel. The model is quite simple to build and when completed will afford hours of enjoyment, especially if the cages are made to carry various small articles such as Meccano Loaded Sacks, etc.

Construction should be commenced by building the framework. Referring to Fig. 2 it will be seen that this comprises four vertical 24½" Angle Girders that are bolted at their lower ends to four 12½" Angle Girders. The method of securing the latter to the vertical girders will be quite clear from the illustration. To the 12½" Angle Girders are attached 12½" Braced Girders that are further supported by means of 2½" Strips bolted across the Braced Girders and secured to the 24½" Angle Girders. The sides of the base are enclosed by means of two 12½" Braced Girders 3 bolted in the positions shown and secured by means of a 5½" Flat Girder 4, the latter being bolted to the Braced Girders and to the side 12½" Angle Girders in the base.

The front and rear 12½" Girders each carry two 3½" Angle Girders 5 that are bolted back to back to the 12½" Girders. These 3½" Angle Girders form supports for four 12½" Angle Girders which are bolted across the base frame as shown.

The four guides 7 for the two lift cages are composed of eight 24½" Angle Girders that are bolted together in pairs to form channel section girders and they are secured in position with the channels facing each other. To secure them, Trunnions are bolted to the lower ends of the guides and to the transverse 12½" Angle Girders in the base. It will be noted that the flanges of the Trunnions are turned inward, that is, underneath the ends of the Angle Girders 7.

The Warehouse contains two floors above the base and each of these is constructed as shown in Fig. 4, which is an underneath view of one of them.

Two 12½" Angle Girders 1a are bolted to three further 12½" Angle Girders 15, one of the latter being bolted across the ends of the Girders 1a, while the other two are bolted in the eleventh and nineteenth holes from those ends respectively.

As in the base, the sides of the first and second floors are enclosed with 12½" Braced Girders 3a that are bolted to the Girders 1a by means of 5½" Flat Girders 4a. The floor proper comprises four 5½" × 3½" and four 5½" × 2½" Flat Plates that overlap and are bolted to the Angle Girders 15. The floors may be secured in position by bolts passed through the vertical 24½" Girders 2 (Fig. 2) of the main framework and also through the Angle Girders 1a (Fig. 4).

When the floors are in position the projecting ends of the Angle Girders 1a (Fig. 4) must of course be at the front of the model. This arrangement will leave a recess between the front edge of the floor and the frame of the warehouse, so as to allow room for the cage guides and for movement of the cages.

The next step is to bolt the 5½" Angle Girders 14 (Fig. 2) to the upper ends of the four vertical Angle Girders 2. After this, four horizontal 12½" Angle Girders should be bolted to the 5½" Girders 14 (see Fig. 2).

The roof is shown in Fig. 3 and consists of a number of 12½" Strips placed side by side and bolted at their ends to 9½" Angle Girders 17. Two equal sides each comprising nineteen Strips should be constructed and these are bolted together at an angle of 90 degrees by means of two Architraves 18. Two 9½" Strips 19 bolted across the Strips forming each side of the roof help to brace the whole firmly together.

(To be Continued)

Parts Required to Build the Warehouse :

38	of	No.	1	6	of	No.	9	2	of	No.	17	2	of	No.	37a	1	of	No.	62	5	of	No.	115
2	"	"	1a	4	"	"	9b	2	"	"	18a	8	"	"	38	4"	"	"	63	4	"	"	126
4	"	"	2	4	"	"	9f	8	"	"	21	1	"	"	40	6	"	"	70	2	"	"	136
1	"	"	2a	2	"	"	10	8	"	"	22a	1	"	"	48	4	"	"	72	2	"	"	140
9	"	"	6	2	"	"	11	4	"	"	24	8	"	"	52a	14	"	"	99	4	"	"	147a
2	"	"	6a	1	"	"	12	4	"	"	26	4	"	"	53	4	"	"	102	4	"	"	147b
12	"	"	7	3	"	"	12a	2	"	"	27a	2	"	"	53a	6	"	"	103	1 Electric Motor			
26	"	"	8	1	"	"	14	2	"	"	32	6"	"	"	58	2	"	"	103b				
4	"	"	8a	2	"	"	15a	424	"	"	37	28	"	"	59	4	"	"	108				

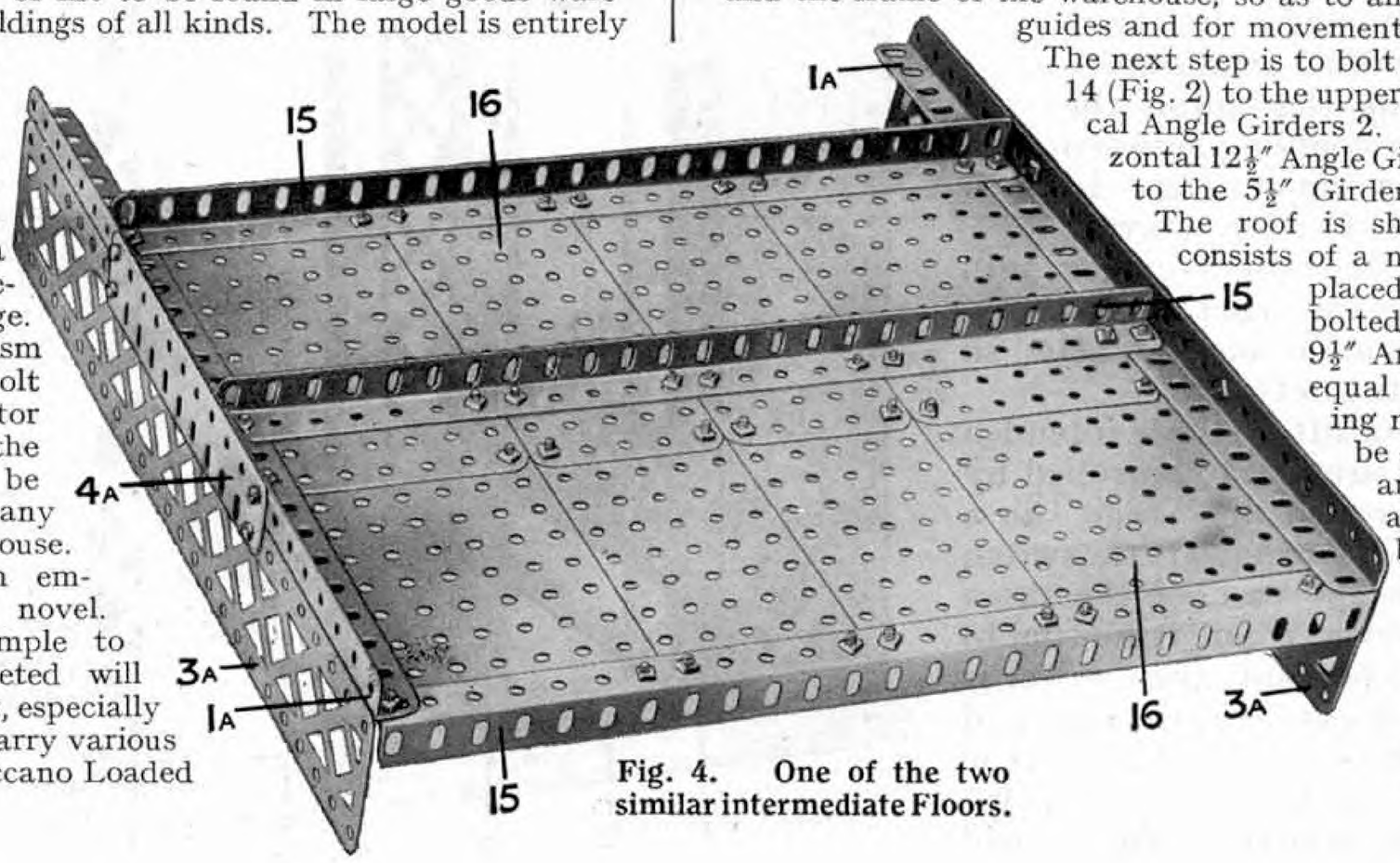
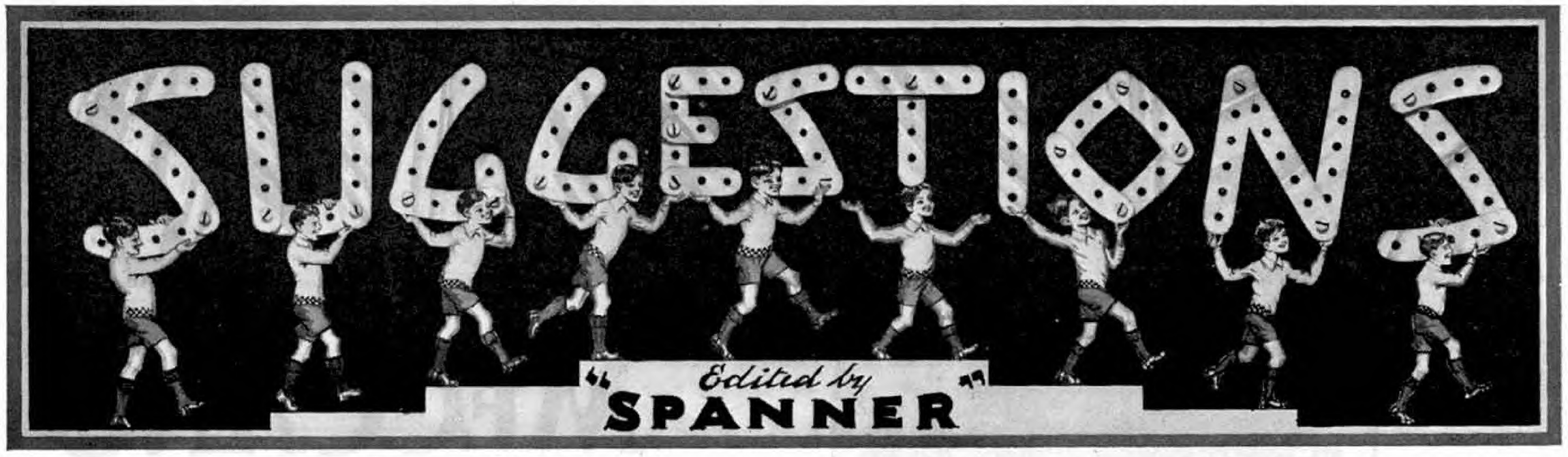


Fig. 4. One of the two similar intermediate Floors.



(196)—New Quick-return Motion

(R. Blick, Southland, New Zealand)

In order to speed up production, planing and shaping machines are fitted with quick return mechanisms that enable the return stroke (during which the tool does no useful work) to be accomplished in much less time than the actual cutting stroke.

It is an easy matter to make such a mechanism in Meccano. For example, the Planing Machine (see Special Instruction Leaflet No. 17) contains a simple form of quick-return motion that forms the subject of Standard Mechanism No. 218.

The working principle of the device shown in Fig. 196 is similar to the standard one, but it imparts a rapid reverse motion to a rotating shaft instead of an oscillating table. A very few words should make clear both its construction and operation.

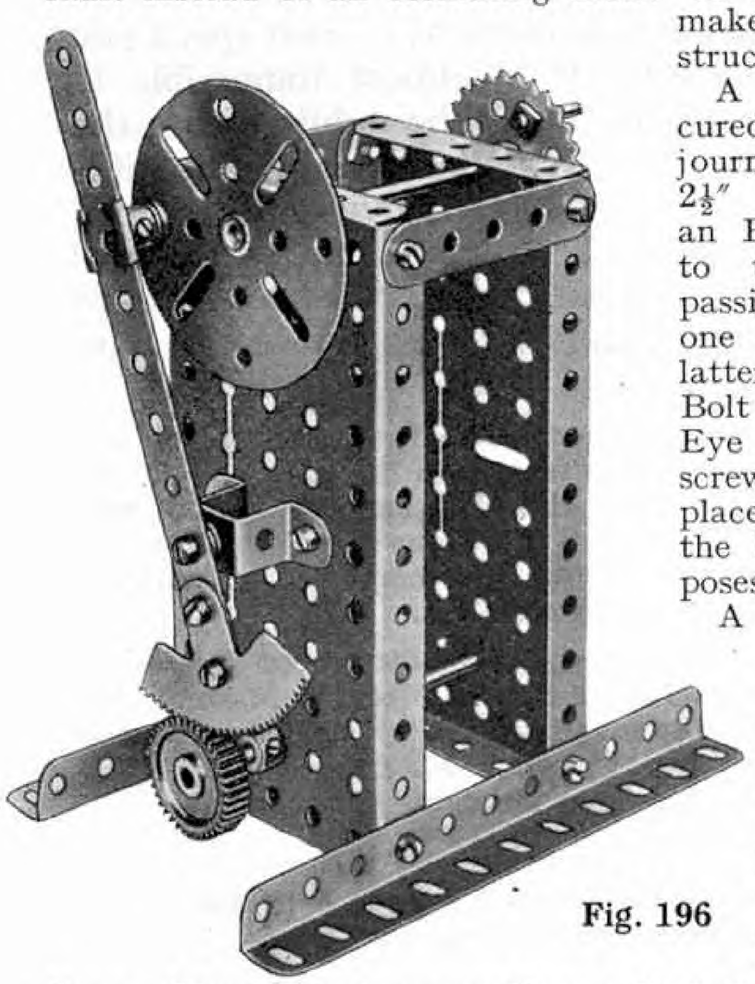


Fig. 196

A Face Plate is secured to a Rod that is journalled in vertical 5½" × 2½" Flanged Plates, and an Eye Piece is attached to the Face Plate by passing a ⅜" Bolt through one of the holes in the latter and securing the Bolt in the boss of the Eye Piece by the Grub-screws. Two Washers are placed on the shank of the Bolt for spacing purposes.

A 5½" Strip is mounted pivotally on a ⅜" Bolt that is double-nutted to a Double Bent Strip, and the Eye Piece slides on the longer arm of the lever so formed, whilst the short arm carries a Rack Segment that engages with a 1" Gear. The latter is secured on a Rod that is journalled in the Flanged Plates and connected by any suitable means to the model that it is intended to operate.

It will be realised that when the device is set in motion the 5½" Strip moves from side to side at a speed that varies according to the distance of the Eye Piece from the fulcrum of the Strip, and this causes the 1" Gear to rotate slowly in one direction and rapidly in the reverse.

(197)—A Speed-recording Device

(E. Thomson, St. Leonards, Sussex)

E. Thomson suggests an interesting device by means of which "graphs" showing fluctuation in speed may be obtained easily. It consists of a centrifugal governor, which is built on the lines of that used in the automatic infinitely-variable speed gear described in last month's "*M.M.*," and is driven by means of a Meccano Clockwork Motor. A Strip that is mounted pivotally on a bolt passed through its centre hole, carries at one end a pencil and at the other end a Threaded Pin, which engages with the groove of the Socket Coupling 5 (see Suggestion No. 192). Variations in the speed of the governor cause the Socket Coupling to slide up or down the Rod, thus imparting movement to the Strip carrying the pencil.

The pencil presses lightly against a sheet of paper that is secured round a Boiler (part No. 162) by rubber bands. The Boiler is rotated extremely slowly by an independent Motor through worm reduction gearing, with the result that the pencil draws a line on the paper, and any kinks in the line denote a variation in speed of the Motor driving the governor.

As the speed of the Motor drops owing to the spring unwinding, so will the line commence to curve, and if graph paper be used on the Boiler, interesting time-performance graphs may be obtained of the Motor under varying conditions.

(198)—Novel Electric Engine

Solenoids prove extremely valuable in the construction of Meccano electrical apparatus, just as they do in real electrical machinery. In the "*Meccano Magazine*" for March, 1928, for example, we described an electrically-operated railway signal, the mechanism of which consisted essentially of a solenoid, whilst electrical beam and horizontal engines driven by the same method were dealt with in the "*M.M.*" for September, 1928.

Another very interesting example of the use of the solenoid is provided by the tiny vertical engine illustrated in Fig. 198. This engine, although only 4" high, runs at a considerable speed and when in operation looks exactly like a steam engine.

A solenoid, as most Meccano boys will know, is actually an electromagnet with a hollow core, into which iron or mild steel rods are drawn when current flows through the coils of the magnet.

The construction of the model should be commenced by winding a Meccano Bobbin to capacity with No. 26 S.C.C. Wire. The completed solenoid may be covered with brown paper to protect the windings and to enhance its appearance. It is retained in position by 1½" Flat Girders, which are attached by bolts to 3½" Strips forming the vertical members of the engine. Each Flat Girder is spaced away from the 3½" Strip by two 1½" Strips, and the lower ends of the 3½" Strips are secured to ½" × ½" Angle Brackets 4. The top ends of the Strips are joined together by Double Brackets. The bolts securing the Angle Brackets 4 to the 3½" × 2½" Flanged Plate forming the base plate of the model also serve to retain in place a Channel Bearing, which forms the bearing for the crankshaft.

The crankshaft consists of a short Rod, to one end of which a Coupling is attached, while on the other end the flywheel is mounted. The Coupling is connected pivotally by a 1½" Strip to the plunger sliding in the core of the solenoid. One end of this Strip is mounted loosely on a set-screw inserted in the grub-screw hole of a Collar on the plunger (a 1½" Rod) and the other end is carried on a bolt held in the Coupling. The flywheel comprises a 2" Pulley that fits inside a Wheel Flange, the two being bolted together to obtain additional weight.

A short length of springy brass strip 1 or Pendulum Connection (part No. 172) is attached to a Terminal 2 and is adjusted so that its free end makes contact with the grub-screw of a Collar that is secured to the crankshaft. Contact must take place on the commencement of the upward stroke of the plunger. One end of the solenoid is connected to the frame of the model and the other to the insulated Terminal 2. Terminal 3 is "not insulated."

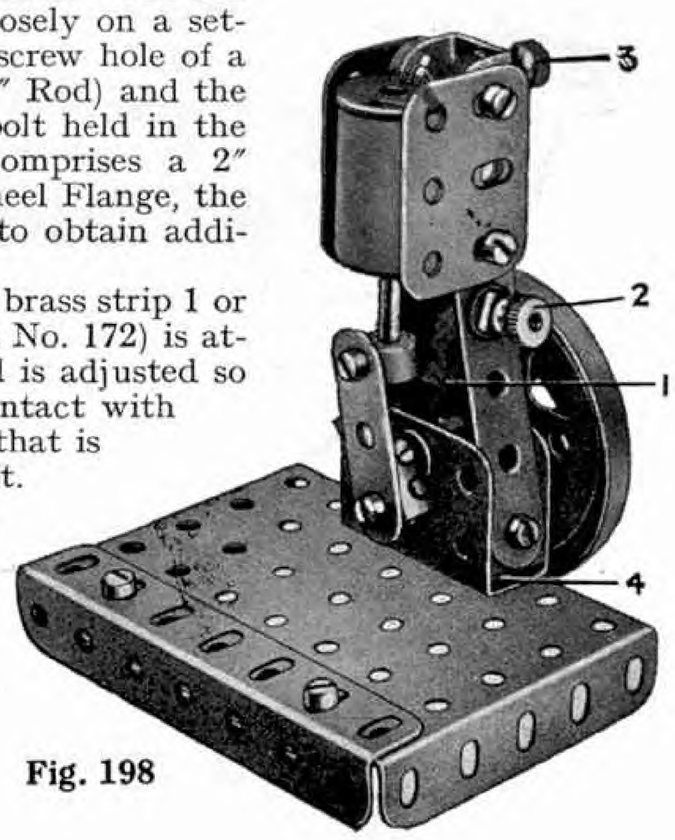
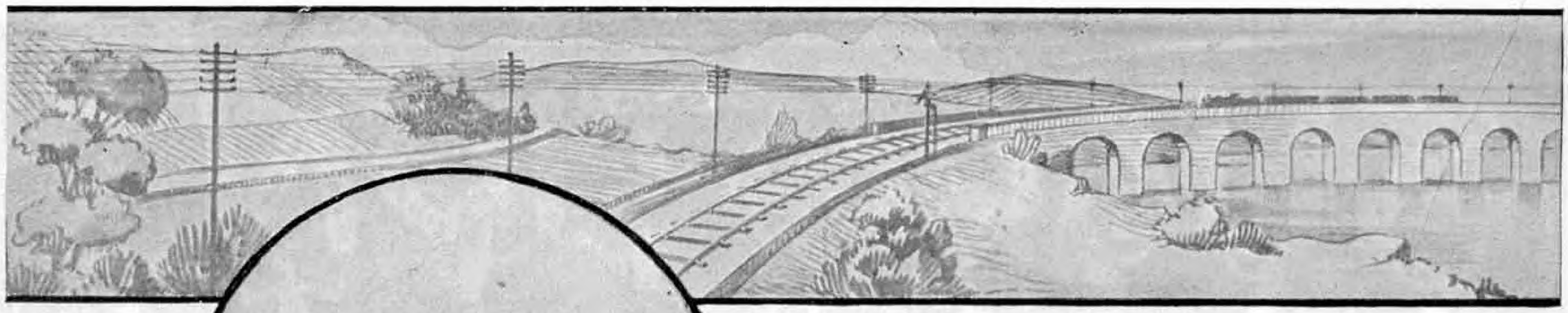
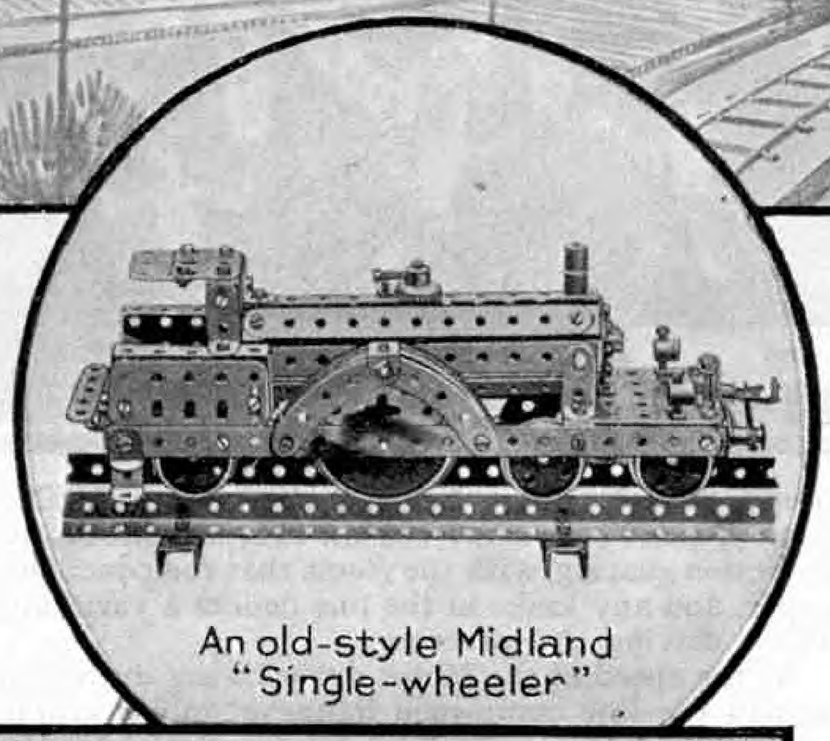
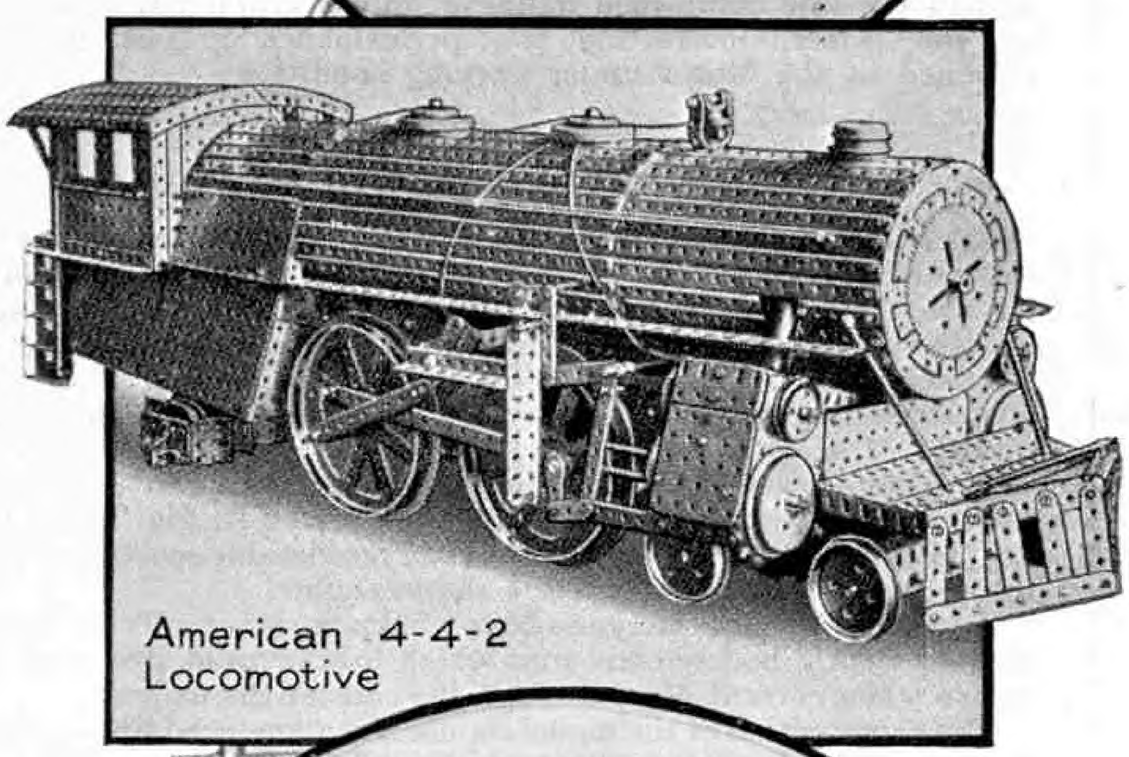


Fig. 198

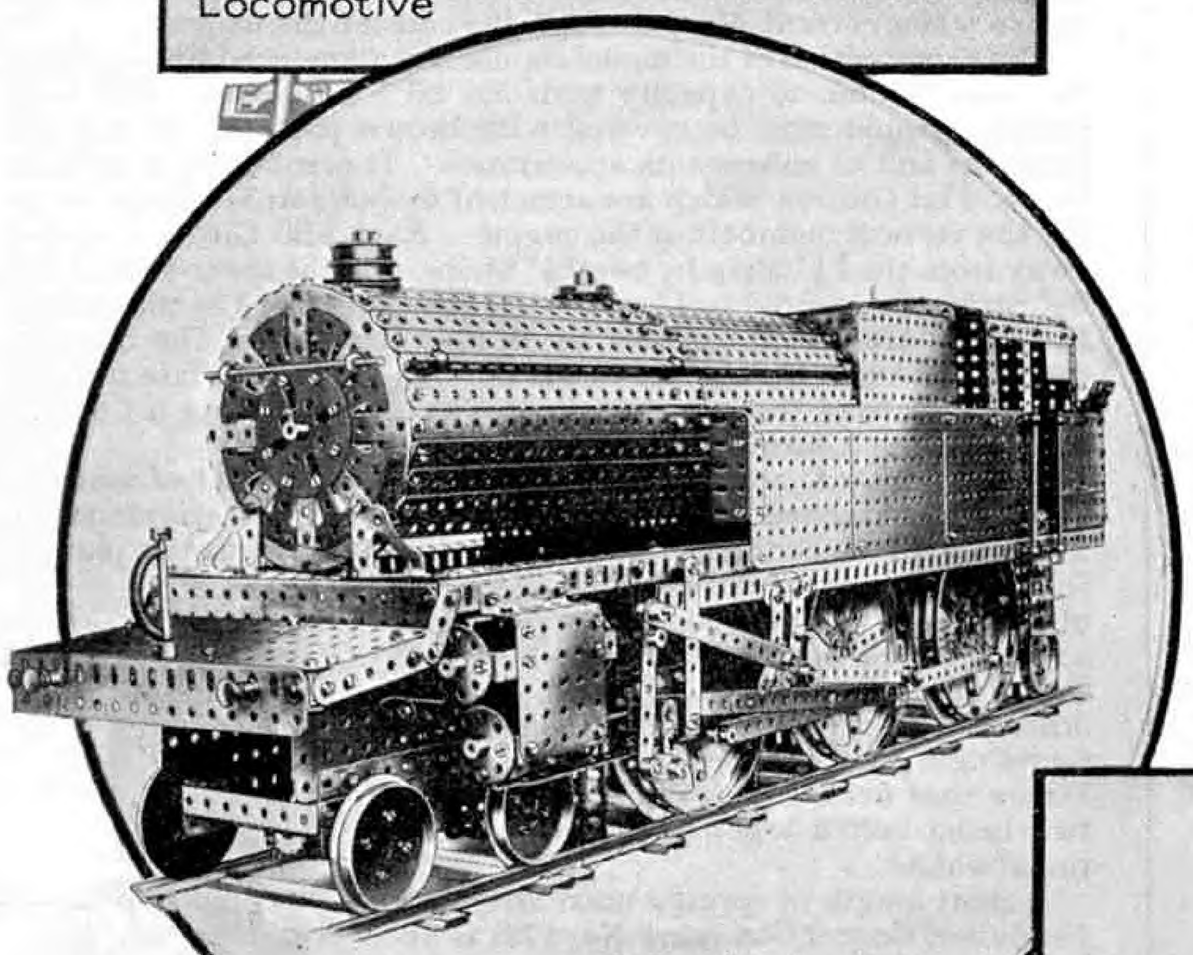




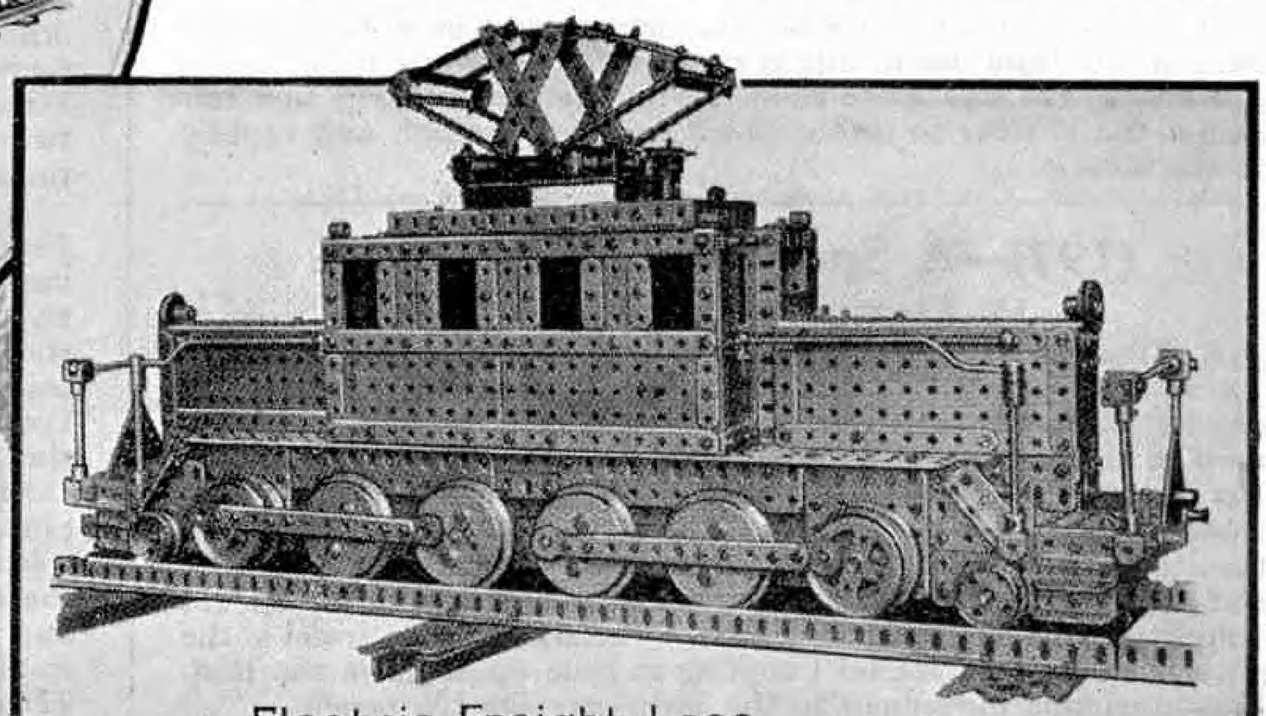
An old-style Midland "Single-wheeler"



American 4-4-2 Locomotive



A typical Meccano Tank Loco.



Electric Freight Loco.

MECCANO

EXAMPLES OF MODEL CONSTRUCTION:

3. Transport by Rail

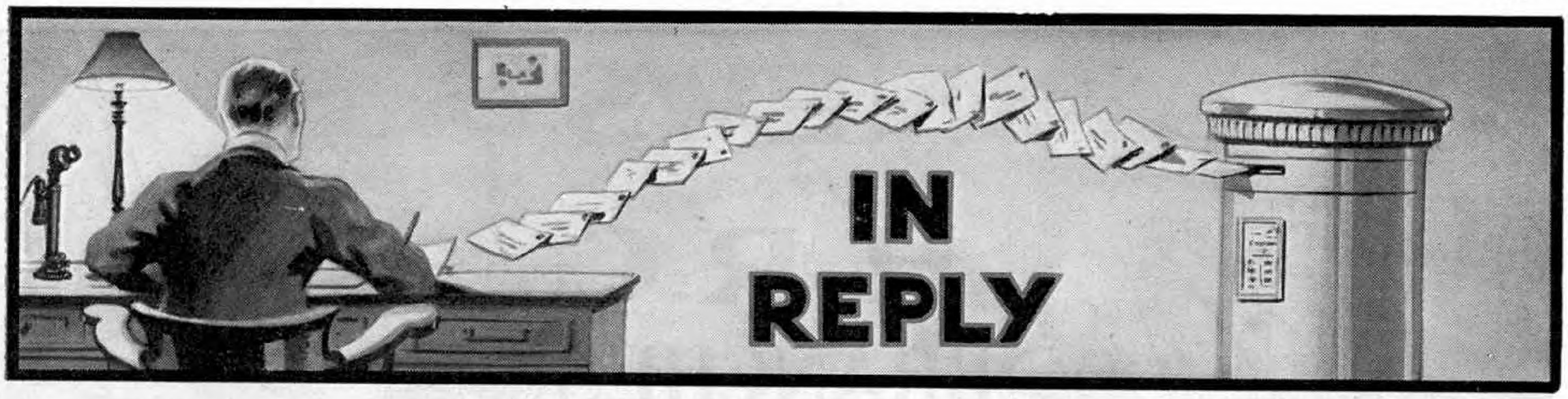
THE present-day railway system is one of the greatest triumphs of engineering. For more than a hundred years a vast network of steel rails has gradually been extending all over the country. Means of locomotion have grown more and more efficient, until to-day we are able to travel for almost any distance at a great speed and with every comfort. It is almost impossible to imagine the everyday life of the public before the introduction of railways. Because of the difficulties of travel the ordinary individual a century ago seldom travelled far from his native town or village, with the result that the countryside beyond a certain radius was as remote to him as a foreign land.

Railway Transport is represented by a number of fine Meccano models, as will be seen from the examples shown on this page. Locos made with Meccano parts are not only realistic in appearance but they may be driven by the Electric or Clockwork Motors and employed in building up complete working model railways.

The old style "Single-wheeler" illustrated forms the subject of Model No. 7.34 in the 4-7 Meccano Manual, and the Tank Loco is fully described and illustrated in Special Instruction Leaflet No. 15 (price 3d. from any Meccano dealer, or 3d. post free from Meccano Ltd.).

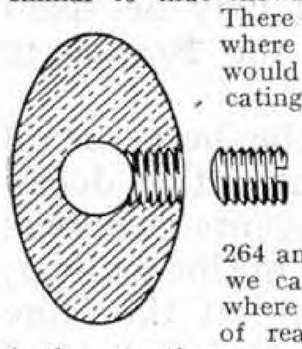
Meccano Outfits range in price from 3/6 to 450/– and may be obtained from all leading toy stores. Ask to see them.

MECCANO LTD., Old Swan, LIVERPOOL



READERS' SUGGESTIONS FOR MECCANO IMPROVEMENTS

ELLIPTIC CAM.—A number of suggestions have been received recently regarding a cam of a type similar to that shown in the accompanying sketch. There are very few instances, however, where the advantages of a special cam would be appreciated, as small reciprocating and rocking motions can quite easily be reproduced with either the Meccano Eccentrics or other standard parts (see heald motion of loom and Standard Mechanisms Nos. 264 and 266). The only instance that we can call to mind at the moment where a small elliptic cam would be of really practical value, would be in the actuating gear of an internal expanding brake, and even here we doubt whether it could be employed successfully without other special parts having to be introduced. Consequently we do not consider its introduction advisable, but if readers can suggest a wider range of utility for the part we shall reconsider our verdict. (*Reply to R. J. Thompson, Birmingham*).



INTERNAL TEETH GEAR.—Your suggested internal teeth wheel or annular gear is well thought out and would function efficiently in practice. You will be interested to know that an internal gear has been under consideration by our production staff for some time past, and a definite announcement regarding its introduction will appear on this page in the near future. (*Reply to Klefstadt Sillonville, La Fleche, S. France*).

NEW CLOCKWORK MOTOR.—The Meccano Clockwork Motor is really quite an efficient little power unit and possesses a wide range of utility in the Meccano system. You will be interested to hear, however, that we hope to carry out some experimental work in connection with the design of the Motor and if it is possible to reduce its size and weight without lowering its power factor we shall certainly carry out the alteration. (*Reply to J. Belaiff, Nice, France*).

NEW ANGLE BRACKET.—A 2″×2″ Angle Bracket would only be suitable for the larger models, and a 1″×1″ Angle Bracket, having suitable flat Strips bolted to it, could be employed. The 1″×1″ type Bracket provides two holes in each lug for securing purposes, and consequently no additional strength would result from the use of a larger article. (*Reply to R. O. Stephens, Norwich*).

ADJUSTABLE ECCENTRIC.—Following on the publication of a suggestion regarding an adjustable eccentric in this page for March, several interesting ideas for adjustable eccentrics have been received. The example illustrated in Figs. 1 and 2 has been very carefully thought out and certainly possesses possibilities. The portions comprising the sheave of the eccentric are shown in Fig. 1, B being a disc of metal machined around its edge so that the portion C is approximately half the thickness of the main disc. A slot A would be cut in the disc, to admit a threaded bush D which would be drilled so that a standard Axle Rod might be placed in it and secured by means of a grub screw. The bush D is secured in any required position in the slot A by means of a locking ring E. The eccentric strap (Fig. 2) would consist of two semicircular members each fitted with a pair of lugs for connecting purposes; their inner circular faces would be grooved as shown to take the "tongue" portion C of the sheave. The main objection to this design, is that the connection between the bush D and the sheave B would not be positive and there would be a tendency for the bush to work loose after prolonged movement of the unit. However, we hope to give this idea further attention in the near future. (*Reply to R. S. Miller, Glasgow*).

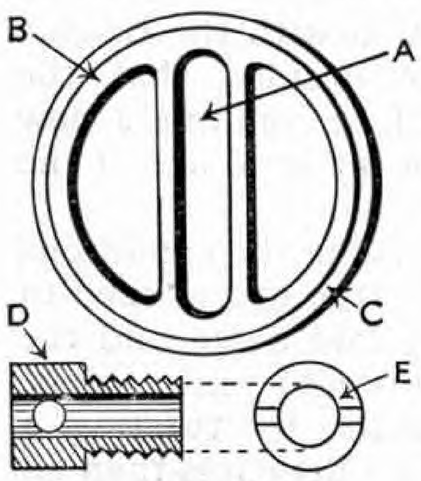
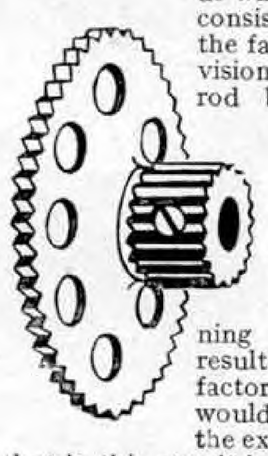


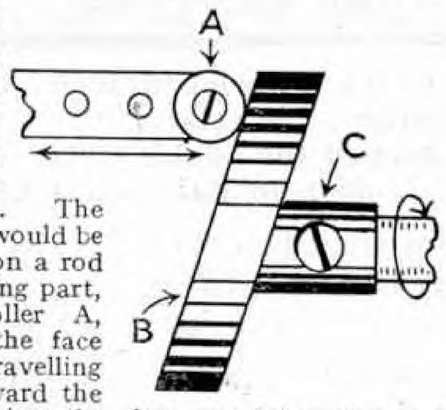
Fig. 1

ROD COUPLING.—We have inspected the sample of your proposed rod coupling and find this quite an interesting unit. The coupling consists of an L-shaped tube prepared from tin plate, into which the standard Meccano Axle Rods can be fitted, and if a large range of shapes were procured it would be possible to join rods in a great variety of positions. The great drawback to the scheme, however, is that this type of coupling would only provide a "push-tight" connection, and it would consequently be useless in any mechanism where any power had to be transmitted by the rods. You will find that the Meccano Coupling will fulfil most requirements, and this accessory possesses the advantage of providing a positive connection between the parts joined. (*Reply to A. Routier, Lillers, P. de C. France*).

COMBINED GEAR AND PINION.—We have noted your idea for a combined gear wheel and pinion unit, and agree that the use of this part would be of assistance in reducing the overall dimensions of model motor car gear boxes, and similar mechanisms. The unit, as will be seen from the sketch, would consist of a pinion secured rigidly to the face of a standard gear wheel, provision for the locking of the unit on a rod being made by a grub screw placed in a threaded hole cut in the face of the pinion. While the idea is quite ingenious we do not altogether agree with the practice of mutilating the face of the pinion to provide a grub screw hole. When meshed with a narrow-faced gear irregular running and wear would be bound to result. Compactness is a very desirable factor in mechanism construction, but it would be poor practice to achieve it at the expense of efficiency, and we consider that in this case it is better to couple the required gear and pinion by means of a Socket Coupling, although the resulting built-up unit will not be as compact as your suggested part. (*Reply to K. Hodges, London, S.W.17*).



"SWASHPLATE."—We have noted your suggestion that the parts necessary to build a model of the swashplate gear should be introduced. The swashplate, as many of our readers will know, is employed in certain types of hydraulic machinery for converting reciprocating motion to rotary motion and vice versa. To enable the gear to be reproduced you suggest the manufacture of a flat disc or plate B (see sketch) mounted obliquely on a boss C of standard size. The disc or swashplate would be suitably mounted on a rod and the reciprocating part, fitted with a roller A, mounted against the face of the plate. In travelling backward and forward the roller A presses against the plate and drives it round, or if the disc is rotated by a motor the portion A is reciprocated. We would point out that the friction created in a small mechanism of this type would be very great, and very low efficiency would result. However, we hope to describe shortly a large model of a swashplate using purely standard parts. (*Reply to R. C. Cross, Hove*).



SPECIAL BLADE.—We do not consider that we would be justified in introducing a special steel blade drilled so that it might be incorporated in Meccano models. We agree that the part might be used in such models as chaff-cutters, reaping machines, and guillotines, but as models of this type can rarely be put to "practical" use, a special knife would be more a potential source of accidents than an item of practical utility. It is generally a better plan to use a Strip, etc., to represent a blade or knife in a Meccano model, but where a sharp cutting edge is imperative, a safety razor blade can be used, suitably mounted in Meccano supports. But be sure to mind your fingers! (*Reply to P. Poole, Boddington*).

CORNER BRACKET.—Your suggested corner bracket (see accompanying sketch) is quite an interesting part. Apparently your idea would be to prepare the bracket from a flat sheet of metal, bending the slotted portions at right angles to each other. A stronger and more serviceable part would result however if the bracket were pressed from a solid sheet, when it would resemble the metal "corners" often used to strengthen boxes, etc., but this process when employed for a part of this size would be costly. As it is, we do not think there would be any advantage in introducing a "cut and bent" bracket as two Angle Brackets bolted together will serve almost equally well, but we hope to give further attention to the "one piece pressing" type of bracket in the near future. (*Reply to S. R. Davidge, Stoke Newington, N.16*).



NEW INSULATING SCHEME.—We have inspected your diagrams and description of a proposed method of insulating the Meccano 6 B.A. Bolts, when secured to standard Strips and Plates, and while we consider the scheme quite well thought out, we are afraid that it would not be advisable to introduce it in place of the existing Meccano Fibre Insulating Bushes and Washers. Your idea, apparently lies in the use of small ebonite or fibre tubes that would fit inside a standard Meccano perforation and whose internal size would permit a 6 B.A. Bolt to be slipped through. These tubes would be used in conjunction with a pair of flat washers, also prepared from ebonite, against which the head of the bolt and the nut on its shank could rest. The great drawback to the idea is that an extensive range of tubes of different lengths would have to be introduced, so that bolts might be insulated in accessories of various sizes. This would complicate matters considerably and would not be by any means as compact and efficient as the existing fibre Bushes and Washers. We cannot therefore consider your scheme. (*Reply to S. Clarke, Nantwich*).

IMPROVED NUT.—Your idea that the faces of the standard nuts should be rounded so as to prevent injury to the enamelled parts is well thought out, and might constitute an improvement. It would not, however, be advisable to "dome" both faces of the nut as this would affect the efficiency of the familiar Meccano "lock-nut" mechanism (S.M. 262) as there would be little appreciable contact area between the two nuts. The best plan would be to remove a piece of metal at each of the eight corners. We hope to consider the idea more fully in the near future. (*Reply to V. Jowett, Chesham*).

ALLOY STRIPS.—Your suggestion that we should produce lengths of perforated annealed alloy strip, that could be cut into short sections as required, is quite novel, but we do not consider it would be advisable to do this for the following reasons. As the Strip would be of soft metal, any great strain could not be placed on it, and it could consequently only be used as tensional members and in light constructional work. The Strips, once cut and bent, would be of little use in other models and they would consequently be very expensive in the long run. One of the great features of the present Meccano system is that every accessory can be used over and over again, and your suggested Strips could not be said to conform to this principle. The existing range of Flat Strips is very comprehensive and we do not think you should have any trouble in obtaining the required lengths or building them up from one or more Strips bolted together. (*Reply to S. Montes, Paris, France*).

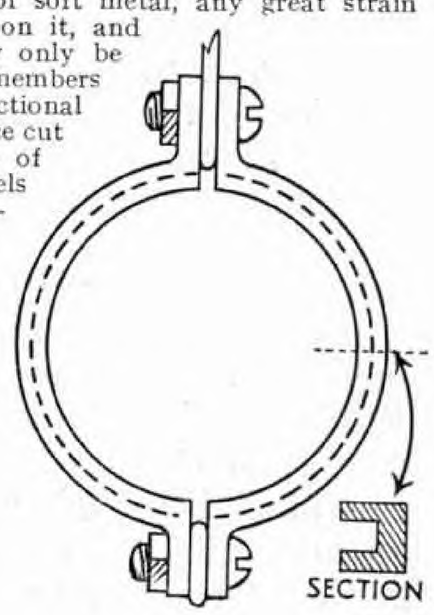


Fig. 2



Cycle Runs with a Purpose

During the present month the light evenings no doubt will tempt members to remain out of doors. There is no reason why railway interest should not be kept up, however, and one of the best means of combining this with healthy exercise is to establish a cycling section. A cycle run without an objective is not always attractive, but members of Branches of the H.R.C. need have no fear on this score. There must be very few Branches that have no important stations, goods depots, engine sheds and interesting stretches of main line within easy reach by this means, and on visits to these places members are certain to discover something that will be of value when track meetings on a large scale are resumed.

Visits need not always be of railway interest, however. Variety should be introduced by arranging at least one excursion for purely social purposes. I hope that on all visits those who possess cameras will not forget to make good use of them. Nothing pleases members more than to have a good pictorial record of the activities of their Branch, and there is always the possibility of producing a photograph that is worthy of reproduction in the pages of the "*M.M.*"



A group of members of the Chiswick Branch, No. 55 : President, Mr. A. P. Dexter ; Chairman, Mr. R. Ferrier ; Secretary, Mr. C. P. Griggs. At a highly successful Exhibition recently organised the double track layout on view represented a line from London to Paris via a Channel Tunnel.

Summer Activities

Excursions of the kind suggested are not the only means of enjoyment available during the summer months, Where possible outdoor games should be organised. The chief of these undoubtedly is cricket, and I urge the officials of all Branches to try to give members an opportunity of displaying their skill in our national game. Other means no doubt will suggest themselves, and I have been greatly interested to note that in a few instances sports meetings have been arranged. Even in Branches with comparatively few members keen and healthy rivalry in athletic contests may be aroused and quite an exhilarating time may be spent in settling who are the champions of the Branch in running, cycling and jumping.

Another excellent plan for making the best use of sunny days is to take the Branch layout out of doors. Lack of suitable ground sometimes prevents members from making use of their railway material in this manner, but where possible it should be done, and at the same time some effort should be made to reproduce the actual conditions met with when a real railway line is under construction. When ravines have to be bridged, embankments built, and tunnels bored in order to enable a satisfactory miniature track to be laid down, the ingenuity of members is given full play and the sense of realism is very greatly increased.

New Members Extend Branch Layout

I have previously referred to the difficulties that an increase of membership may bring. The Chairman of one Branch has solved the problem of what to do with new members in a very effective and interesting manner that possibly may be suitable for adoption in other cases. As all the responsible positions in connection with the Branch layout were adequately filled, he decided that the newcomers should be given the task of building a new line to a small town a few miles distant from one of the junctions on the Branch layout.

In order to represent as far as possible the conditions under which Branches of this kind often are worked in real practice, a single line only was laid down and the staff system of working was brought into operation. A suitable "staff" was made by twisting a piece of wire into a circle of diameter a little less than an inch to which a short straight portion was attached, and of course no train was allowed to run unless the staff actually was being carried in the tender.

Branch Notes

WEST KENT.—Operations are being carried out on a temporary track. On this are two termini and a long tunnel, at one end of which colour light signals have been installed. Members are becoming adept in team work and are looking forward to realistic work on the permanent track now being constructed. Rolling stock is being overhauled in preparation for use on this. Secretary: F. R. Dubery, 48, Reddons Road, Beckenham, Kent.

HAROLDWOOD.—It has been decided to elect a new General Manager every month. This official supervises track work and by this arrangement each member in turn is given excellent practice. Several new books have been added to the Branch Library, and Meccano accessories for use on the Branch layout are being made. Secretary: C. L. Barber, "Beaurains," Church Road, Haroldwood.

KING'S NORTON.—Successful outdoor track meetings have been held, and these are to be regular features of the summer programme. The Stations and Signal Boxes on the Branch layout have been fitted with electric light, which is also used on the Pullman Cars run on the track. Secretary: P. L. Hughes, "Merrie Meade," West Hill Road, King's Norton, Birmingham.

CHISWICK.—Publication of *"The Headlamp,"* the Branch magazine, has commenced, copies being sold at 2½d. each. The first number has many excellent features, including Branch reports and news, railway articles and gossip, jokes and competitions. At present the Magazine is cyclostyled, but future issues probably will be printed. Operating rules for track working have been drawn up, and colour light signalling has been introduced. At an Exhibition in the Branch room the usual double track was supplemented by relief lines and five trains were worked continuously to timetable. A Meccano aerial railway also attracted attention. Secretary: Mr. C. P. Griggs, 25, Elliott Road, Chiswick, London, W.4.

TOWN AND COUNTY SCHOOL (NORTHAMPTON).—A special feature is made of the running of famous expresses. The *"Royal Scot,"* the *"Irish Mail,"* the *"Mancunian"* and the *"Ulster Express"* make regular runs on the Branch track. The programme is varied by arranging suburban and goods working meetings. A Branch library is being started, each member contributing at least one book. A visit is to be made to Engine Shed No. 5 of the L.M.S. Secretary: B. S. Godfrey, 46, Baring Road, Northampton.

KATHLABERKE.—At one meeting members keenly debated the respective merits of the four British railway groups. An interesting contest has been held in connection with the garden railway under construction, members competing being asked to design a layout for a section of the railway. Model railway accessories are being made from Meccano parts. A visit to Charfield Station (L.M.S.) has been made. Secretary: R. Bennett, Church Street, Wotton-under-Edge.

WIMBORNE GRAMMAR SCHOOL.—The club room has been fitted with shelves supported on trestles and a well-designed track is being laid down. This includes two stations, and electric signalling apparatus is being installed for communication purposes. A home-made signal control has been fitted and is proving very useful. Secretary: A. M. Hooper, 98, Shaftesbury Avenue, Highfield, Southampton.

IPSWICH.—A record number of seven lectures have been given during the month. Two of these were on *"Locomotives of the G.W.R."* and *"Realism on Model Railways"* respectively and were of particular interest. At one meeting for track work the lights were put out and a night service was run. Interesting visits have been paid to the local station, when members were allowed on the footplate of an 0–6–0 locomotive, where they inspected the inside of the firebox. They also were taken for an interesting trip on the footplate of a 4–4–0 passenger engine. In accordance with a decision of the Branch General Committee certain sections of the Branch track are to be re-laid and the rails screwed down. Members are learning the bell signalling code employed on real railways, and hope shortly to use it during operations to be carried out on the re-organised Branch track. Secretary: P. E. Buck, 10, Dial Lane, Ipswich.



(Above) L. T. Arnold, Leeds (H.R.C. No. 6984), at the terminal of his open-air layout. (Right) T. Griffin, Southsea (H.R.C. No. 15609), oiling his locomotives.

FIRST CARDIFF.—On a visit to the Cardiff engine sheds of the G.W.R., members were allowed to mount the footplates of several locomotives and to go beneath an engine under repair in order to inspect the inside cylinders and mechanism. Other visits have been made to the Printing Works and Offices of the *"South Wales Echo"* and to the Cardiff Gas Works. Secretary: A. V. Strong, 47, The Parade, Roath, Cardiff.

THE STROUD GREEN.—For the present time devoted to track work has been reduced in order that improvements may be made to the layout. An interesting addition is an incline from the main line to a shelf, erected eight inches above, on which locomotive sidings have been constructed. Later it is hoped to widen this shelf in order to include carriage sidings and sheds. Secretary: E. C. Burrage, 47, Connaught Road, Stroud Green, London.

BLACKPOOL (SOUTH SHORE).—Two terminal stations have been erected and signal gantries installed. A Meccano turntable and point have been embodied in the Branch track. Visits are made regularly on Saturdays to the local station, where many interesting locomotives have been inspected from the footplate. Secretary: R. V. Bentley, 9, Bamton Avenue, Watsons Road, South Shore, Blackpool.

OVERSEAS

BELGRANO (ARGENTINA).—Electric light has been installed in the Branch room and the cost of this is being met out of Branch funds. The Branch track consists of three lines that completely encircle the room. In the stations these are increased to five and numerous sidings are provided, making comprehensive and interesting track work possible. It is proposed to form a special section, the members of which will devote their attention entirely to electric trains. Secretary: James E. Nickson, Av. Forest 2030, Belgrano, F.C.C.A. Buenos Aires.

Further Branches in Course of Formation

The following new Branches of the Hornby Railway Company are at present in process of formation and any boys who are interested and desirous of linking up with this unique organisation should communicate with the promoters, whose names and addresses are given here. All owners of Hornby trains or accessories are eligible for membership, and the various secretaries will be pleased to extend a warm welcome to all who send in their applications:—

BRIGHTON—J. Woolgar, 35, Lennox Road, Hove, Brighton.

CHINGFORD—H. E. Jones, 167, Winchester Road, Highams Park, Chingford. London, E.4.

EARLSHEATON—Wm. Fountain, 116, Town Street, Earlsheaton, Dewsbury.

EWELL—R. F. Jordan, "Whiteleaf," Hampton Grove, Ewell.

GLOSSOP—W. Pliver, Rose Villa, North Rd.

LONDON, W.5—I. A.W. Laurie, 82, Warwick Road, Ealing, W.5.

MANCHESTER—A. Aldous, 1, Marlow Street, Hadfield, Manchester.

PORTHCAWL—R. James, Central Pharmacy, John Street, Porthcawl.

SHEFFIELD—T. Kent, 82, Limpsfield Road, Brightside, Sheffield.

WEYMOUTH—H. L. Mallow, Nettlecombe, Weymouth.

OVERSEAS

NEW ZEALAND—M. H. Johnstone, Mangateretere, R. D. Hastings, Hawke's Bay.

S. RHODESIA—K.Wilkinson, 60, Park Road, Bulawayo, S. Rhodesia.

Further H.R.C. Incorporated Branches

116. WEST NORWOOD—G. W. Allison, 81, Stradella Road, London, S.E.24.
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120. MAIDENHEAD (FURZE PLATT)—J. A. P. Owen, "Windrush," Furze Platt, Maidenhead.
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MEMBERS OF THE H.R.C. ARE ENTITLED TO WEAR THIS BADGE WHICH IS BEAUTIFULLY ENAMELLED IN COLOURS

Hornby Railway Company

JUNIOR SECTION

XVIII.—Improving the Appearance of a Layout

MEMBERS OF THE H.R.C. ARE ENTITLED TO WEAR THIS BADGE WHICH IS BEAUTIFULLY ENAMELLED IN COLOURS

VERY soon after building up a small layout and learning how to run on it a timed service of passenger and goods trains, the Junior railway enthusiast inevitably begins to add various accessories in order to make his miniature railway appear more impressive. This is a course that is strongly to be recommended. The realistic appearance of a layout is greatly improved by placing on it miniature reproductions of tunnels, foot bridges, level crossings, signal cabins and other useful accessories, and it greatly increases the pleasure of watching the progress of a model express train to know that it is running over a line that has a reasonable resemblance to a genuine railway track.

Special care must be taken that these accessories are correctly placed, for otherwise they look unnatural and give a layout a ridiculous appearance. It must be remembered that they are not meant to be ornamental only, but are expected to serve useful purposes, and nothing could be worse than to place them in such a manner that this is obviously impossible.

Tunnels are accessories that often are placed in unnatural positions. No railway company takes the trouble to build a tunnel except when absolutely necessary, for structures of this type are very expensive luxuries! There is a story to the effect that the route originally planned for the Canterbury & Whitstable Railway was altered in order that a tunnel could be included. The reason given was that this would be an attraction to passengers!

Even if this story is true, it is an isolated example of a determination to include a tunnel at any cost, and one that should not be followed even by the most inexperienced of model railway owners. Every effort therefore should be made to give a tunnel a position similar to that it would occupy on a real railway. This cannot be done by merely placing it across the track. By far the best position is in a corner of the layout, where it may occupy space that otherwise is difficult to fill. Usually this step gives an opportunity of providing a background of miniature hills that to a certain extent account for its presence.

It also is possible to make really serious mistakes in placing a signal cabin, and probably scarcely any other accessory requires so much care. The signalman who is supposed to occupy it must have a good view of operations involving use of the points and signals that he controls. In addition, trains approaching on the main line should be visible over as long a stretch as possible. The box, therefore, must not be pushed into any lineside position that may appear convenient. Instead it should be placed in a fairly prominent position.

The end of one of the platforms of the station usually is the best place in which to establish a signal cabin. On real railways, and therefore also on good miniature layouts this often is a central situation. In it the signalman is well placed for carrying out his ordinary duties, and also for examining passing trains in order to see that no doors are open, that the rear lamps are correct, and generally that all is in order.



Tony MacLachlan, the stern judge who passes sentence on members of the Dunedin (New Zealand) Branch of the H.R.C., who have been guilty of causing accidents on the Branch track!

Some thought also should be given to the positions of the signals themselves. Those controlling access to sidings offer little difficulty, but an effort should be made to place the main line signals where they may readily be seen by drivers in good time to act on the instructions they convey. For instance, a signal should never be placed behind a bridge, or at the outlet from a tunnel. In the former position it may be obscured, unless of course, a specially tall post is in use. The outlet of a tunnel is an even worse position, for the driver of a train emerging into daylight would have only a second or two in which to observe the position of the arm on a signal so placed.

Another point of interest concerns the visibility of the signals themselves. On real railways these are put in positions where they show up plainly against the sky. Occasionally this is impossible, however, and it is necessary to place them in front of a dark background. An excellent example of this is shown in the photograph on page 323 of the April "*M.M.*" On this the signals on the "down" line are in front of the dark hillside beyond the station. As the photograph shows, the difficulty of seeing plainly the positions of the arms is overcome by placing behind them a white board. The necessity for fitting the signals on miniature railways with boards of this character is not perhaps very often met with, but the hint may prove useful to an owner who likes to add a realistic touch to his layout.

Some of the most common mistakes in planning model railways are made in placing footbridges and level crossings. Too often these are included in the layout without sufficient thought, and they lose the greater part of their effect because they do not appear to lead anywhere. It should be remembered that on

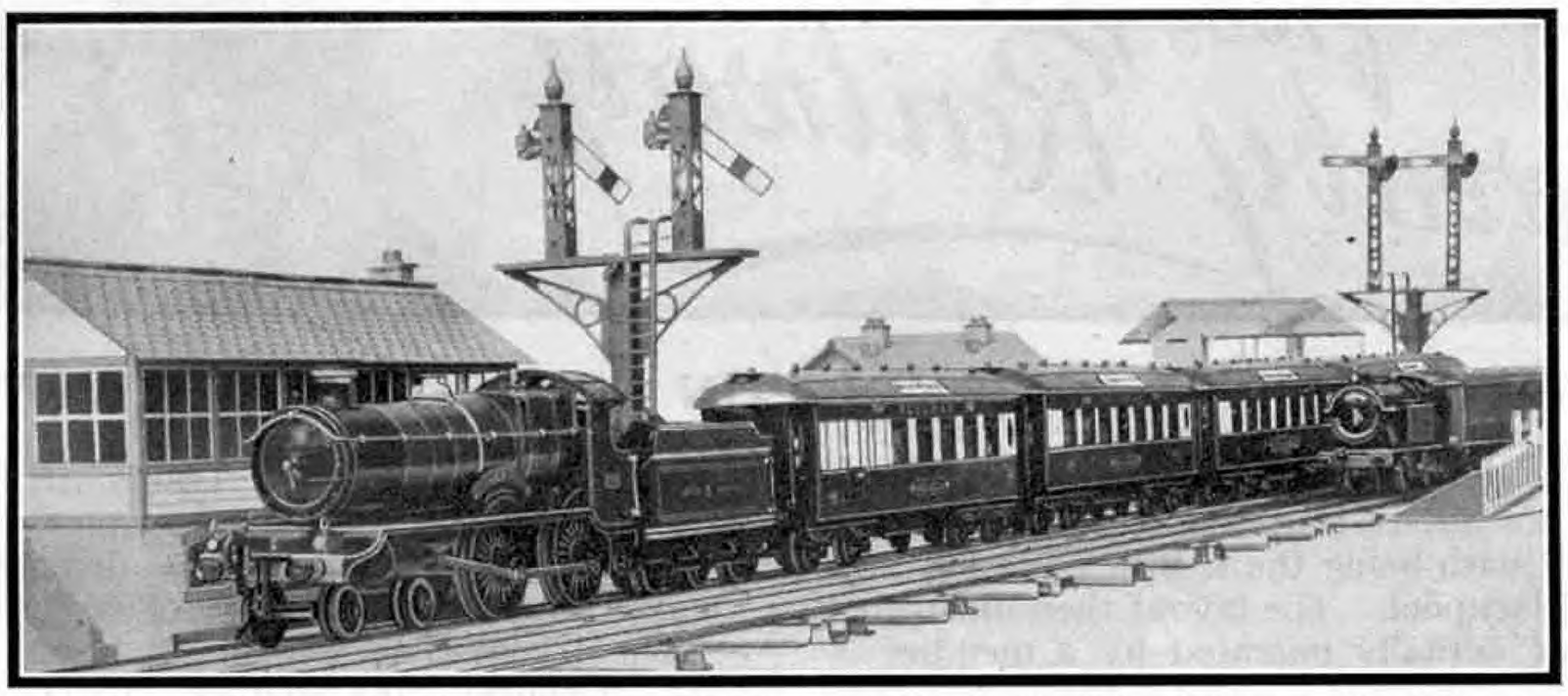
real railways a level crossing is only used at points where a sufficient amount of traffic crosses the line to justify its existence. Most crossings of this kind naturally are near stations, which are built in centres of population, and on a model railway also the correct position for one should be sought near a station. Some effort should be made to indicate the existence of roads leading to and from such a crossing.

Footbridges also look best when used in conjunction with stations, to which they give a realistic appearance when they are placed at the ends of platforms. Of course, there are instances in which a footbridge crosses a line at a considerable distance from a stopping place. The enthusiast who wishes to make use of the accessory in a position of this kind may do so without loss of reality, if he takes the precaution to include on each side of the track a representation of at least a portion of the footpath that is responsible for the erection of the bridge.

A viaduct is very attractive and there must be few model railway enthusiasts who have not endeavoured to make use of one. It is most useful for a layout permanently screwed down to boards, and in most cases probably the best course is to place it as far away from other accessories as possible. One mistake that must be avoided at all costs is that of having near it a parallel track. This immediately suggests that the viaduct is superfluous, and that the engineer responsible for the construction of the miniature line could have avoided its use by making a comparatively slight deviation!

It is scarcely necessary to give detailed advice on the positions of an engine shed or water tanks. A shed naturally is placed near the chief station or goods yard, and the water tank stands outside it in order that engines may fill up with water before starting out on the day's work. Care should be taken that the water tank is in a position where easy access may be obtained both from the station and from the shunting yard.

A turntable is a very fascinating accessory and is deservedly popular with enthusiasts. In order to give it the best appearance and also to make it most useful a little care should be taken in devising a suitable position for it. It should be placed where locomotives from adjacent portions of the track or of the sidings may be run on to it and turned round with the least possible waste of time. This means that it must be near the main station and close to the engine shed, and often it is worth while making slight alterations to the layout in order to accommodate it.

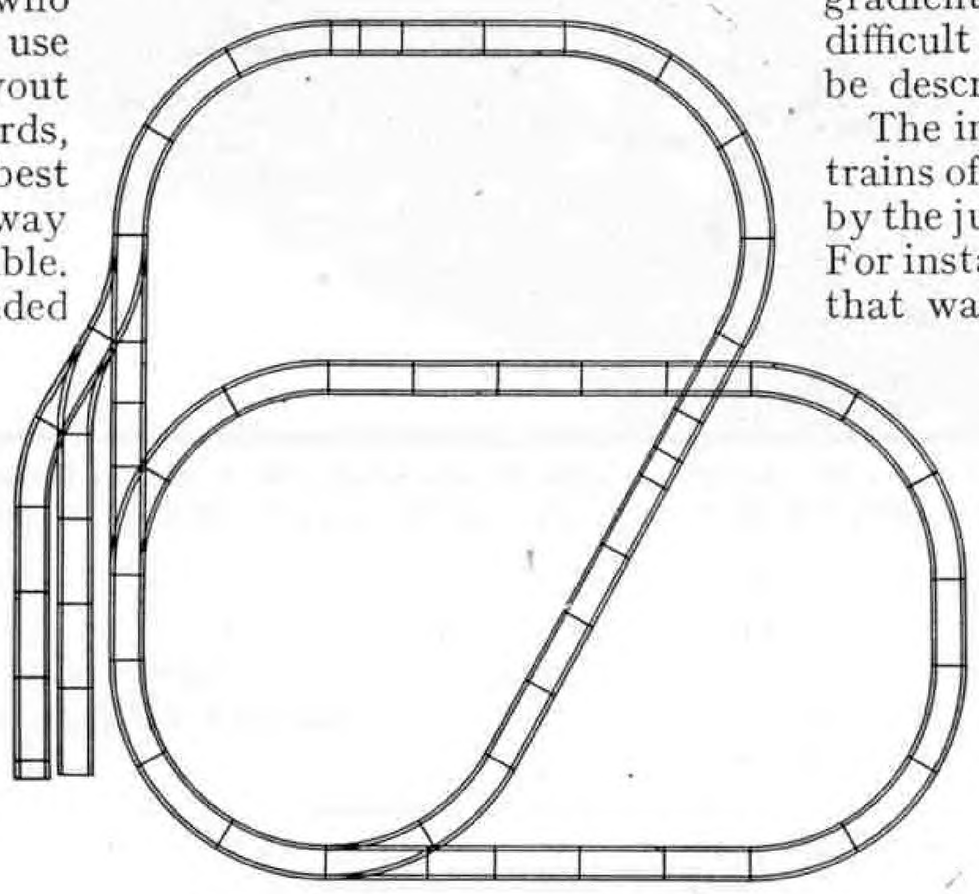


A miniature "Torquay Pullman" Express, hauled by a Hornby No. 2 Special locomotive "*County of Bedford*," passing a suburban train standing at a station. The Signal Cabin is centrally placed between two sets of tracks and therefore commands a good view of approaching trains.

This by no means exhausts the list of accessories that help to give a realistic appearance to a miniature railway; for instance, gradient boards and mile posts are of great assistance in this respect. The mile posts should not be placed too far apart. Scale distances are impossible, and probably an interval of about 3 ft. suits most Junior layouts. The gradient boards should be placed where the inclines are supposed to be. These may be imaginary, but it is quite good fun to arrange slopes to correspond with them. This is quite easily done by mounting a section of the rails on boards, slightly elevated at one end. A little ingenuity will give a track that offers very interesting possibilities. Care should be taken not to overdo the gradients, however, for even the most difficult of real railway lines can scarcely be described as a switchback!

The interest and excitement of running trains of all kinds may be largely increased by the judicious placing of warning boards. For instance, if a tunnel is used, the board that warns drivers of their approach to it should be employed in conjunction with it. Similarly the "Caution" and "Whistle" boards should be placed ahead of level crossings and other dangerous places on the line, in order to play their part in the prevention of accidents.

The manner in which warning boards should be employed is practically settled by their purpose. Of those included in the Hornby System the only one that appears to offer any difficulty is the one marked "Catch-Points," and enquiries concerning its use often are received from beginners. The points it indicates are placed on ascending gradients that are steeper than 1 in 260. They branch off from the track in the reverse direction, and thus are so placed that vehicles accidentally detached from a train and running backwards down the incline may be turned off the main line and derailed. Their usual position is a little more than a full train's length to the rear of the "home" signal.



Suggested Layouts (No. 11)

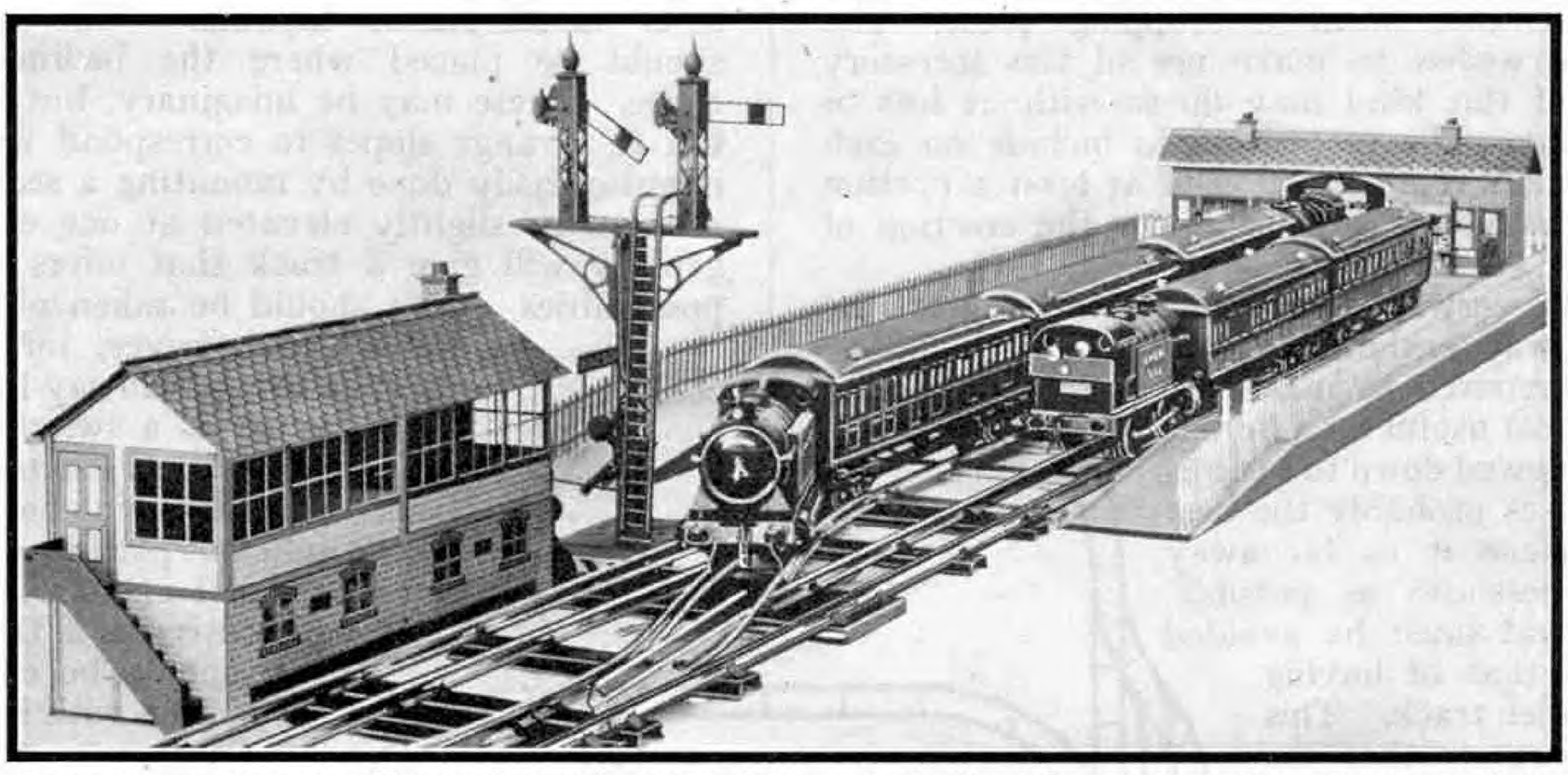
2′ Radius (as illustrated): 20 Curves, 25 Straights, 2 ½-Straights, 3 ¼-Straights, Acute Angle Crossing, 2 R.H. Points, 2 L.H. Points.
1′ Radius: 7 Curves, 5 ½-Curves, 18 Straights, 2 ½-Straights, 4 ¼-Straights, Acute Angle Crossing, 2 R.H. Points, 2 L.H. Points.



XX.—INTENSIVE WORKING ON MINIATURE RAILWAYS

LAST month we showed how to reproduce the chief features of an interesting section of main line, the one dealt with being the L.M.S. route between Manchester and Blackpool. The layout then illustrated is based upon one actually operated by a member of the H.R.C., and we explained how terminus-to-terminus working of a very interesting character could be carried out on it.

This month we propose to deal with another type of layout that undoubtedly will be popular with many miniature railway enthusiasts. It is suitable for operations of quite another kind, for it is one on which may be maintained an intensive service similar to that run on busy suburban lines.



Intensive working on a Hornby layout ! A train in charge of a No. 1 Special Tank is leaving the station, and a second train is ready for departure as soon as the way is clear.

One of the most interesting services of this kind is that maintained on the G.E. section of the L.N.E.R. from Liverpool Street. On this line an enormous number of passengers are conveyed daily to and from suburban stations. The tracks used for similar purposes in many large cities at home and abroad have been electrified, and at frequent intervals during the last 30 years it has been proposed to follow this plan in the case of the lines from Liverpool Street. Owing to the dislocation that would ensue, and the temporary stoppage of goods traffic that possibly would result, the change has not been made and thus steam locomotives are still in operation.

The service given is probably the most intensive of its kind in the world that is operated in this manner. The amazing number of trains run over the suburban lines radiating from Liverpool Street could not have been organised were it not for the fact that much special work has been carried out in order to facilitate their rapid movement. Signalling is of the ordinary mechanical type, but is so efficiently handled that delays are reduced to a minimum. Trains arriving in the station are quickly dealt with in accordance with a well-planned system, and are immediately disposed of in order to make way for those that follow.

The locomotives principally used on these services are, of course, tank engines. Usually these are of the 0–6–0 type, but 2–4–2 and 0–4–4 locomotives also are in use. These are of small size. To-day more powerful engines are required, for trains are heavier, and therefore a large number of modern 0–6–2 tanks have been put into service. These are similar to the one seen in the accompanying illustration, which shows a locomotive actually engaged in suburban traffic on the line from Liverpool Street.

In the Hornby Series the No. 1 Special Tank Locomotive is very suitable for duties of this kind, and for lighter "turns" the No. 1 Tanks may be used. Both locomotives have exceptional haulage capacity, in view of their size, and as they are of compact design, they are particularly valuable in operations of the kind described in this article.

A suitable layout for an intensive service is illustrated on the opposite page. Needless to say, it is far from being as complicated as the actual layout of Liverpool Street and the lines leading from it! It is a simple track that may readily be assembled by miniature railway enthusiasts, who will be able to carry out on it really interesting operations of varying degrees of complexity.

From our illustration it will be seen that the station is a terminus and that an engine shed and a siding are included in the layout. Crossovers are provided in order that locomotives and coaches may be transferred from one of the two platform roads to the other. Outside the station the main tracks diverge. On leaving

the terminus trains travel round a loop that passes through the suburban stations at which passengers are taken up or put down. The extent of the loop may be varied in order to suit the circumstances of the owner of the line, and as many halts or stations may be arranged as may be desired. In addition its shape may be adjusted in order to suit the available accommodation.

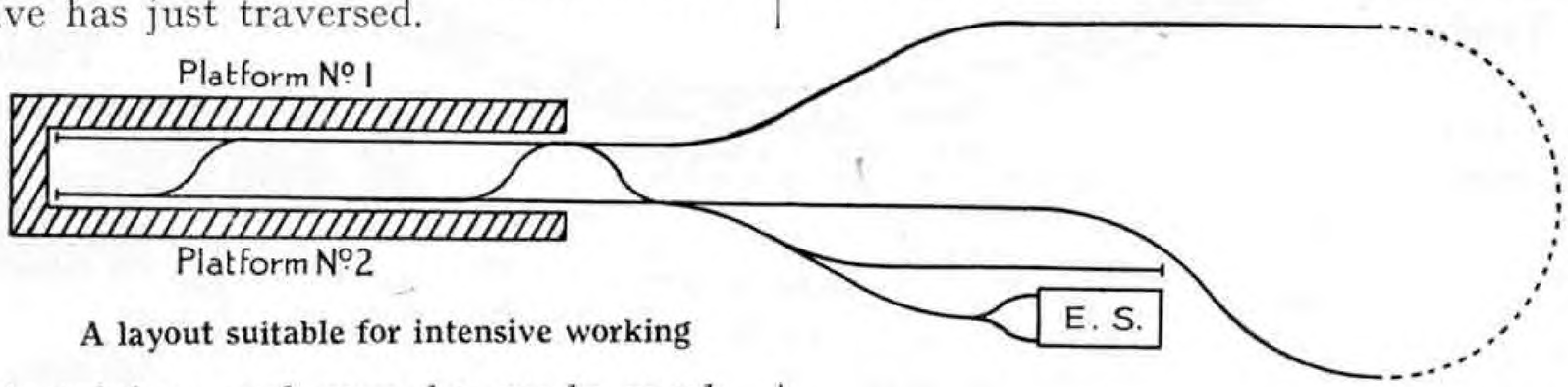
Let us first consider the simplest service we may operate on such a track. We will suppose that a suburban train is standing alongside platform No. 1. A tank locomotive emerges from the shed, takes in water and, the points being set, proceeds down the line to the station. It is duly coupled up and when all is ready the train departs. It traverses the layout indicated by the dotted line, calling at wayside stations, and in due course arrives in platform No. 2, the locomotive stopping short of the trailing crossover at the buffer stop end.



A suburban train on the way to Liverpool Street. On the 0-6-2 Tank Locomotive, No. 826, at its head may be seen the discs used instead of headlamps on the G.E. section of the L.N.E.R.

Very soon after its arrival the train must return, in order to maintain the intensive suburban service we are supposed to give. The locomotive is uncoupled and, by means of the crossover previously referred to, it runs on to the parallel track and so past the train. The points of the second crossover are then altered, and the engine backs on to the opposite end of the train. When the signal for departure has been given this reaches its correct line by means of the crossover that the locomotive has just traversed.

This operation may be performed as many times as may be desirable. Although extremely simple, it is none the less entertaining, and may be made much more so by fixing times for the departure of trains and adhering closely to schedule. To give the correct "atmosphere," this timing should be "tight," as railwaymen say.



A layout suitable for intensive working

If more rolling stock and additional locomotives are available, the service may be made more intensive, and the fun to be obtained is enormously increased. Let us suppose that we have two set trains standing in the station, each headed by a locomotive. The first departs and the second follows after a suitable interval. In order to accommodate them both on their arrival, one may be switched over by means of the facing crossover and dealt with at platform No. 1, while the second may run straight into platform No. 2.

If we have only two locomotives and the train at, say, platform No. 2 is due out shortly, we are presented with a little problem, for both our locomotives are trapped. We may get out of the difficulty by allowing the train at No. 1 platform to back out of the station and over the crossover, and come to rest opposite the locomotive shed. If the coaches are not required for some time, they may be pushed directly into the siding. The locomotive of this train then uncouples and proceeds to the train at platform No. 2, from which the other engine has been detached. To this train it is attached and promptly to time it takes its departure. With the type of tank engine usually employed, it is not necessary to spend time turning the locomotive round.

We are now left with a train of coaches in the siding and a locomotive at platform No. 2. The engine runs out to the siding and draws the train into the platform, coming to a stand between the two crossovers. After rounding the train by means of these, it is ready again for departure.

Another method of working that may be employed is to have the two trains departing from the station at regular intervals, each locomotive running round the coaches in the manner already explained, while the other train is making the circuit of the layout. If the track is lengthy there should be quite sufficient time in which to carry out the operations in the stations and to clear the way for the incoming train. In any case there should be no difficulty on this score, for the timetable may be so arranged that the train out on the track takes a sufficient length of time over the journey to allow this to be done.

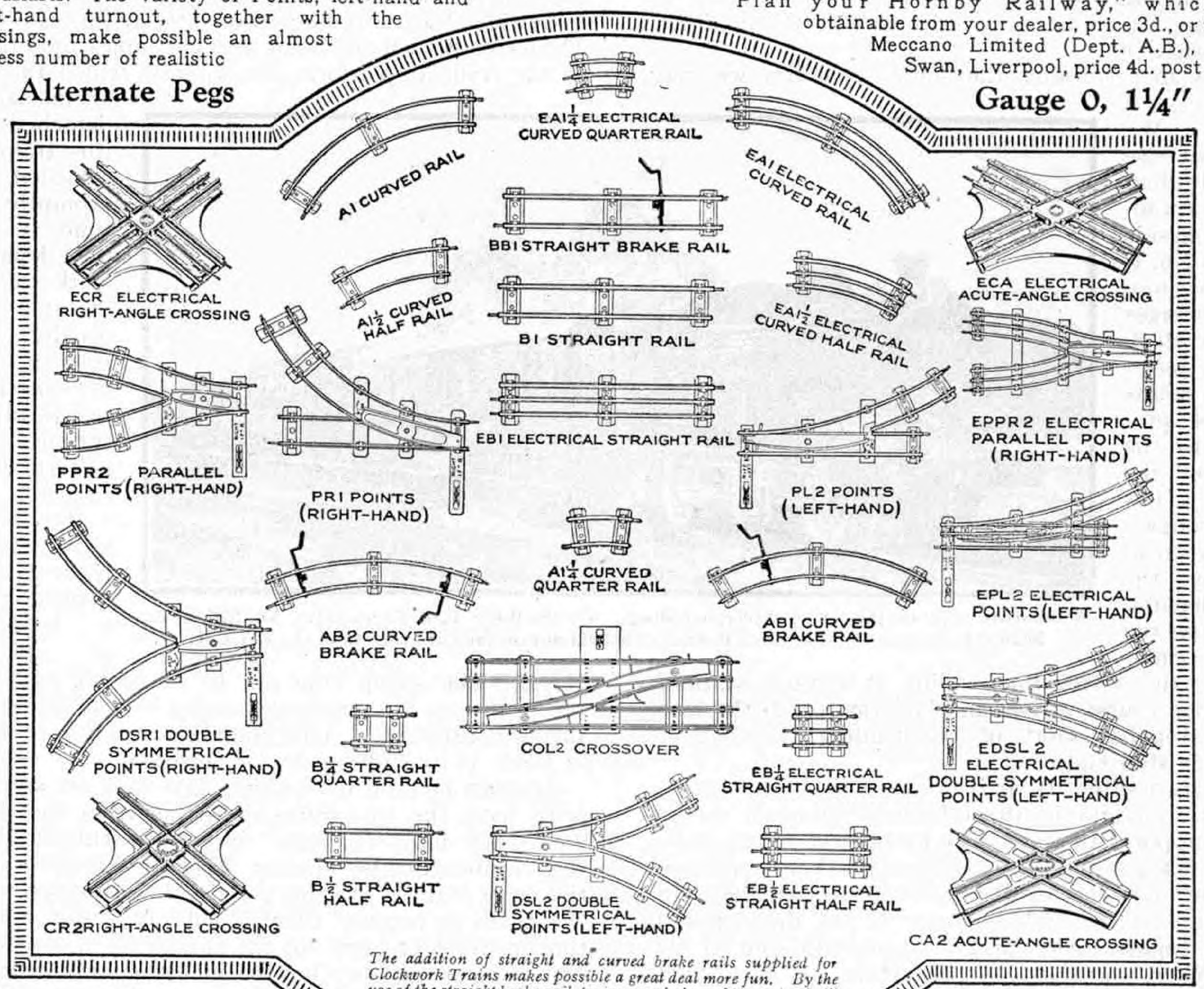
More exciting operations are possible if we possess two additional locomotives. For instance, suppose that two trains have arrived within a short space of time and are scheduled to depart almost immediately. In that case the two extra locomotives may be kept ready on the siding, and as soon as the trains come to rest at the platforms they back on to them. After their departure the two locomotives that brought the train in may proceed to the siding and fill up with water in readiness to run back to the station as soon as the trains return.

To follow this course means rapid working, and the maintenance of an intensive service will tax the skill of the model railway owners who adopt it. It is ideal for co-operative effort, however, and may be recommended to officials of Branches of the H.R.C. (*Continued on page 512*)

Hornby Series -:- Rails, Points and Crossings -:- Hornby Series

Hornby Rails, Points and Crossings are designed to meet the most exacting requirements of model railway enthusiasts. The variety of Points, left-hand and right-hand turnout, together with the Crossings, make possible an almost endless number of realistic and railway-like layouts. The adaptability of the Rails, Points and Crossings is well shown in a special booklet "How to Plan your Hornby Railway," which is obtainable from your dealer, price 3d., or from Meccano Limited (Dept. A.B.), Old Swan, Liverpool, price 4d. post free.

Alternate Pegs — **Gauge 0, 1¼"**



The addition of straight and curved brake rails supplied for Clockwork Trains makes possible a great deal more fun. By the use of the straight brake rail, trains may be brought to a standstill at the station platform in a very realistic manner.

Rails for Clockwork and Steam Trains

CURVED RAILS

1-ft. radius

A1	Curved rails	per doz.	4/6
A1½	Curved half rails	„	3/6
A1¼	Curved quarter rails	„	3/-
AB1	Curved brake rails	each	6d.

2-ft. radius

A2	Curved rails	per doz.	4/6
A2½	Curved half rails	„	3/6
A2¼	Curved quarter rails	„	3/-
AB2	Curved brake rails	each	6d.
DC2	Curved rails, double track ...	½ doz.	7/6

DOUBLE SYMMETRICAL POINTS

For 1-ft. radius curves

DSR1	Double symmetrical points, right	per pair	5/-
DSL1	Double symmetrical points, left		

For 2-ft. radius curves

DSR2	Double symmetrical points, right	per pair	5/-
DSL2	Double symmetrical points, left		

PARALLEL POINTS

PPR2	Parallel points, right	... per pair	5/-
PPL2	Parallel points, left		

CROSSINGS AND CROSSOVERS

CA1	Acute-angle crossings (for 1-ft. radius tracks)	each	2/-
CA2	Acute-angle crossings (for 2-ft. radius tracks)	„	1/9
CR1	Right-angle crossings (for 1-ft. radius tracks)	„	2/-
CR2	Right-angle crossings (for 2-ft. radius tracks)	„	1/9
COR2	Crossovers, right hand ...	per pair	12/-
COL2	Crossovers, left hand ...		

POINTS

For 1-ft. radius curves

PR1	Right-hand points	... per pair	4/-
PL1	Left-hand points		

For 2-ft. radius curves

PR2	Right-hand points	... per pair	4/-
PL2	Left-hand points		
PSR2	Points on solid base with ground disc and lamp, and adapted for Hornby Control, right ...	per pair	8/6
PSL2	Points on solid base with ground disc and lamp, and adapted for Hornby Control, left ...		

STRAIGHT RAILS

B1	Straight rails	per doz.	4/-
B½	Straight half rails	„	3/-
B¼	Straight quarter rails	„	2/6
BB1	Straight brake rails	each	5d.
BBR1	Straight brake and reverse rails	„	1/6
DS1	Straight rails, double track ...	½ doz.	6/6
RCP	Rail connecting plates	„	4d.

Rails for Electric Trains

STRAIGHT RAILS

EB1	Straight rails	per doz.	7/-
EB½	Straight half rails	„	4/6
EB¼	Straight quarter rails	„	4/-
EDS1	Straight rails, double track ...	½ doz.	8/6

CURVED RAILS

1-ft. radius

EA1	Curved rails	per doz.	8/-
EA1½	Curved half rails	„	5/-
EA1¼	Curved quarter rails	„	4/6

2-ft. radius

EA2	Curved rails	per doz.	8/-
EA2½	Curved half rails	„	5/-
EA2¼	Curved quarter rails	„	4/6
EDC2	Curved rails, double track ...	½ doz.	9/-

CROSSINGS

ECA	Acute-angle crossings	each	4/-
ECR	Right-angle crossings	„	4/-

POINTS

For 2-ft. radius curves

EPR2	Right-hand points	... per pair	10/-
EPL2	Left-hand points		

DOUBLE SYMMETRICAL POINTS

For 2-ft. radius curves

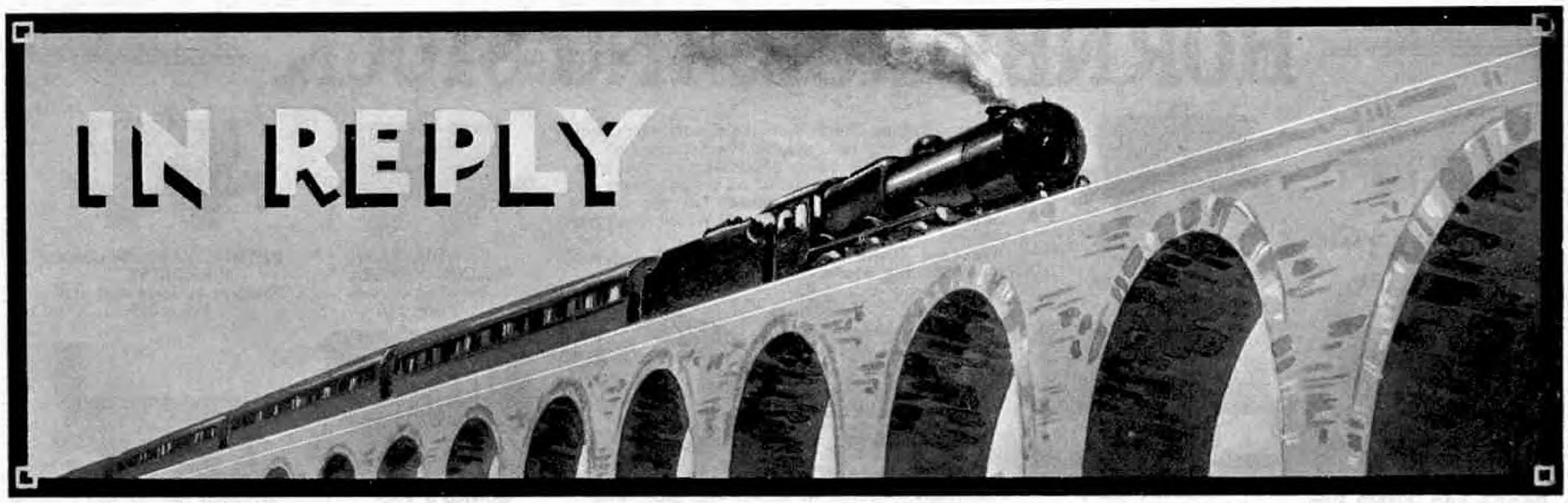
EDSR2	Double symmetrical points, right	per pair	12/-
EDSL2	Double symmetrical points, left		

PARALLEL POINTS

EPPR2	Parallel points, right	per pair	12/-
EPPL2	Parallel points, left		
TCPL	Terminal connecting plates (low voltage)	each	1/6

Electrical Points for 1-ft. radius curves are not supplied

Manufactured by MECCANO LIMITED, OLD SWAN, LIVERPOOL



Suggested Hornby Train Improvements

PLATFORMS TO SUIT STANDARD CURVED RAILS.—The introduction of platforms to suit the curves of our standard rails would enable Hornby Train owners to fill awkward corners of their layouts, but we doubt if stations built with them would be satisfactory owing to the small radius of the curve. (*Reply to P. E. Buck, Ipswich*).

SLIDING DOORS IN LUGGAGE VANS.—To fit our No. 1 and No. 2 Luggage Vans with sliding doors, as you suggest, would be more in accordance with modern practice. We shall consider the alteration, as we think it would be popular with many Hornby Train enthusiasts. (*Reply to L. Grugeon, Chiseldon*).

0-4-4 TANK LOCOMOTIVE.—There are considerable objections to the employment of this type of locomotive. The large overhang from the rear driving wheels to the trailing end renders a locomotive of this type unsteady when running backwards and is a cause of trouble when it is negotiating curves in a forward direction. For this reason we are unlikely to make the type standard in the Hornby System. (*Reply to J. P. Dixon, Bournemouth*).

KITCHEN CAR.—Until dining cars are included in the Hornby System there does not appear to be any point in manufacturing a kitchen car. Should a dining car be added to the present range, we may consider the production of a kitchen car to run in conjunction with it, but more probably a composite dining and kitchen car would be made. (*Reply to J. Perry, Handsworth, Birmingham*).

SINGLE-BOLSTER TIMBER WAGONS.—Your suggestion that we should modify the existing No. 1 Lumber Wagon by substituting a single bolster for the two on the existing vehicle is interesting. The timber wagons made in this manner would be run in pairs. When our rolling stock is revised we shall carefully consider this idea. (*Reply to D. Ockend, Littlehampton*).

OUTSIDE THIRD RAIL.—We do not think that any special advantage would result if we were to change the design of our electric rails by placing the conductor rail outside the running rails. Rails of this kind could not be used in conjunction with the existing electric track and extensive alterations to our electric locomotives would be necessary. For these reasons we are unlikely to adopt your suggestion. (*Reply to P. Blackham, Bexhill-on-Sea*).

DEAD-END BUFFER STOPS.—Buffer Stops of the pattern you describe are frequently used in sidings, especially in country districts, and we agree that they would be an attractive addition to the Hornby System. Their introduction will be considered. (*Reply to J. Kay, Brixton*).

WATER CRANE.—A water crane similar to that shown in your sketch would be suitable for station platforms and other places where the use of the present water tank is not desirable or absolutely correct. We shall consider the introduction of this accessory into the Hornby Series. (*Reply to R. J. Saunders, Penarth*).

MODEL COACHES WITH CLERESTORY ROOFS.—A high elliptical roof for passenger coaches is stronger and gives more air space than the clerestory pattern, and as it is cheaper to make it probably will be used on Hornby passenger coaches, if it is decided to produce these. (*Reply to J. C. Woodward, Nottingham*).

ARTICULATED TRAIN SETS.—We are aware that trains of articulated coaches of the pattern you describe are in regular use on the L.N.E.R. and to a less extent on the G.W.R., and the introduction of similar coaches may prove popular with Hornby Railway enthusiasts. One great merit of such vehicles is that they economise in space, and as this would be a valuable feature on a miniature layout we shall give attention to the idea. (*Reply to C. M. Bannerman, Hitchin*).

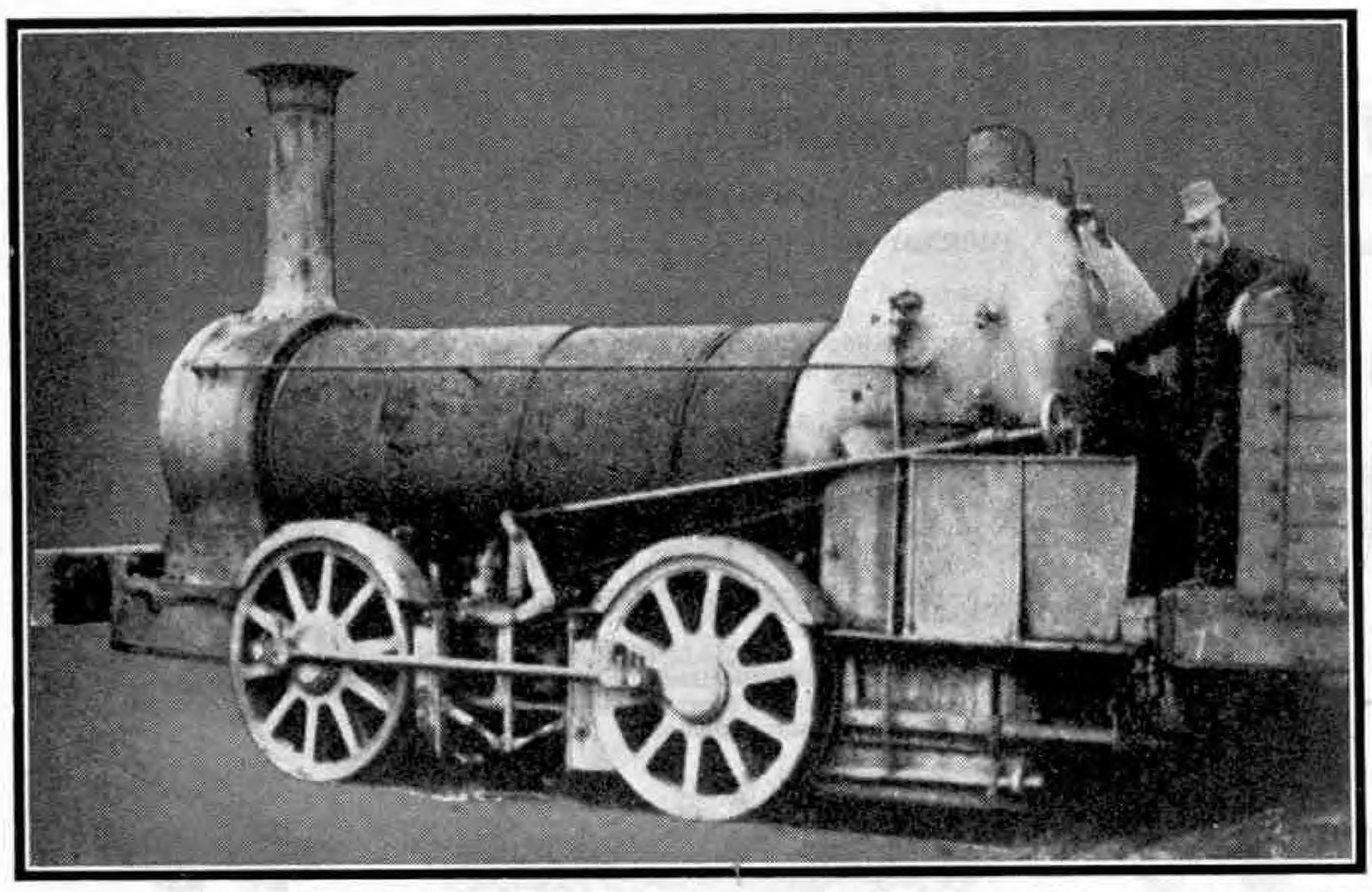
CONTROL WIRE GUIDE BRACKETS.—We are interested in your suggestion that control wire guide brackets should be made to fit the sleepers of double track at points between the pairs of rails. We think there are possibilities in the idea, and it will be carefully examined. (*Reply to L. Whitmore, Kensington, London*).

WAGONS FOR "LOCO COAL."—That we should introduce wagons lettered to represent those used in actual practice for the conveyance of "Loco Coal" has previously been suggested, and probably these would be very popular. When our Rolling Stock is revised we shall consider their production. (*Reply to D. H. Tyler, Exeter*).

UNDERGROUND RAILWAY TRAIN SETS.—We are interested in the suggestion that we should introduce a train set to represent the "Underground" type of tube trains. The objection to this is that without tubes realism is lost, and if long tunnels are employed to represent these, the trains are out of sight during the greater part of each run! (*Reply to T. T. C. Carter, London, W.C.1*).

SLIP COACH COUPLING.—Many requests for the introduction of a Slip Coach have been received and we are carrying out experiments on a new design. We hope shortly to make an announcement on this point. (*Reply to W. F. Hewett, Leeds*).

AUTOMATIC COUPLINGS.—Automatic couplings to enable coaches to be slipped, and wagons to be readily coupled and uncoupled when shunting, would be an attractive addition to the rolling stock of the Hornby System. Their employment would greatly increase costs, but we shall consider your proposal, and particularly the possibility of introducing couplings of this kind to be fitted by Hornby Train owners to their rolling stock as desired. (*Reply to P. L. Taylor, Newcastle, Staffs.*).



An early 0-4-0 goods locomotive built by Bury of Liverpool. It has bar frames and the "haystack" firebox characteristic of engines designed by that pioneer firm. The last engines of this type were built for the Furness Railway in 1861, and one survivor, now preserved as a relic at Barrow-in-Furness, is popularly known as "Old Coppernob."

SETS OF RAILS FOR CERTAIN FORMATIONS.—Your suggestion that boxed sets of rails and points necessary to make up certain formations should be introduced is very interesting. For instance, the material required for a three-road goods yard similar to that illustrated on page 401 of the May "*M.M.*" could be sold together. We shall bear your idea in mind, but we think that the majority of enthusiasts prefer to build up and extend their own layouts. (*Reply to W. Jamieson, Victoria, Australia*).

EIGHT-WHEELED TANK WAGONS.—A bogie Tank Wagon of the kind illustrated on page 288 of the April "*M.M.*" would be an attractive addition to the rolling stock of the Hornby Series. A large and elaborate model of this pattern would be costly and this would probably reflect on its popularity. We shall keep the idea in mind, however, and if a sufficient demand for such a vehicle seems assured its introduction will be considered. (*Reply to P. L. Whittley, Boreham Wood Herts.*).

TURNTABLE FITTED WITH BRAKE-STOPS.—We were interested in your suggestion that the Hornby Turntable should be fitted with brake stops. These would have to be fixed in various positions to suit different locomotives, however, and we are afraid the suggestion is not really practical. (*Reply to J. Richards, Worthing*).

DOUBLE TRACK POINTS.—Many suggestions have been received with regard to the various patterns of double track points that might be introduced in the Hornby System. These are now under consideration. (*Reply to K. L. Thomas, Swanage*).

LUGGAGE TRUCKS FOR S.R. BOAT TRAINS.—We doubt if there would be a great demand for miniature reproductions of these trucks, or for the luggage boxes conveyed in them. Their use would add to the realism of boat trains, however, and we shall keep the idea before us. (*Reply to A. S. Williams, Tonbridge*).

L.M.S. "GARRATT" LOCOMOTIVES.—Locomotives of this type cannot be introduced in the Hornby System, as at present no six-coupled mechanism is available. In miniature railway practice the extreme length of these locomotives is a considerable disadvantage. (*Reply to D. Armstrong, Elstree*).

HORNBY SERIES

HORNBY ROLLING STOCK

GAUGE 0

Hornby Rolling Stock includes almost every type in use on the big railways, and a selection of the splendid range available is illustrated on this page. The various items are modelled on realistic lines and are beautifully enamelled, mostly in the correct colours of the L.N.E., L.M.S., G.W. or Southern Railways.

Ask your dealer to show you the full range of Hornby Rolling Stock.



PETROL TANK WAGON "PRATTS"
Finished in green.
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PETROL TANK WAGON "B.P."
Finished in yellow.
Price **2/6**



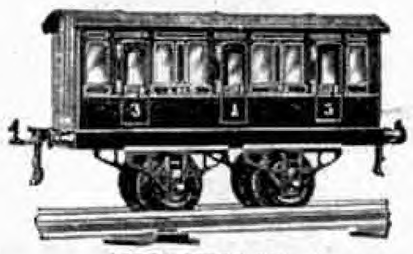
PETROL TANK WAGON "SHELL"
Finished in red.
Price **2/6**



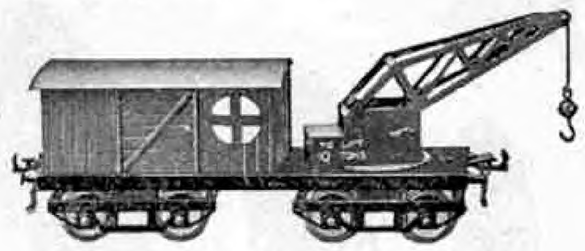
PETROL TANK WAGON "REDLINE"
Finished in blue and red.
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BRAKE VAN (French Type)
Lettered "Nord." Beautifully finished in colours. Opening doors. Price **4/-**



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Realistic in design and fitted each side with opening doors. Price **2/6**



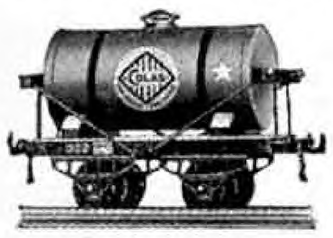
***BREAKDOWN VAN AND CRANE**
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GUARD'S VAN
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"Dining" or "Sleeping."
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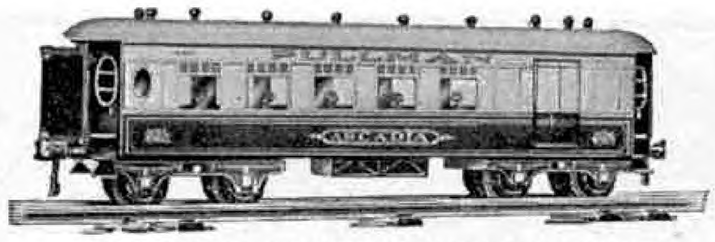
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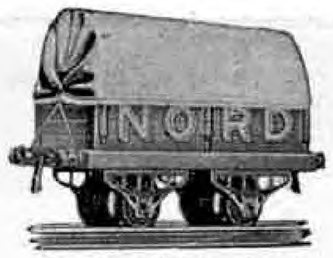
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Excellent design and finish. Lettered "Robert Hudson Ltd." Price **2/6**



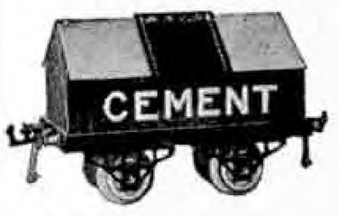
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An interesting model of the single-barrel type of wine wagon used in France. Finished in red and green.
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†HORNBY No. 2 SPECIAL PULLMAN COACH COMPOSITE
As supplied with No. 2 Special and No. 3 Pullman Train Sets. One part is designed for passenger accommodation and the other for conveyance of luggage. Suitable for 2-ft. radius rails only.
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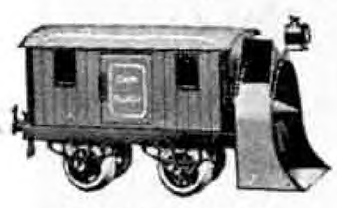
COVERED WAGON (French Type)
This wagon is fitted with frame and sheet. French type, lettered "Nord." Price **3/-**



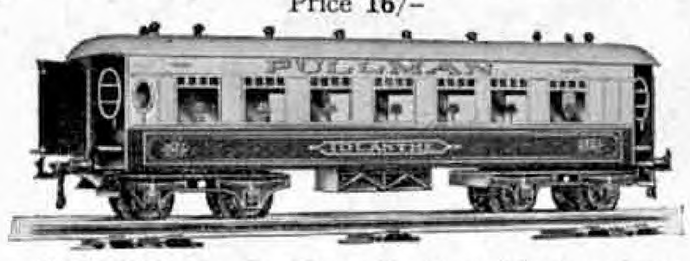
CEMENT WAGON
Finished in red.
Price **3/-**



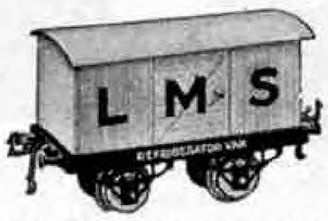
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Beautifully enamelled in green and red. Price **1/9**



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With revolving plough driven from front axle.
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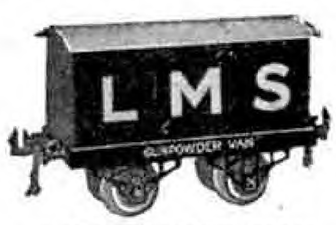
†HORNBY No. 2 SPECIAL PULLMAN COACH
As supplied with No. 2 Special and No. 3 Pullman Train Sets. This splendid coach is perfect in detail and finish. Suitable for 2-ft. radius rails only. Price **15/-**



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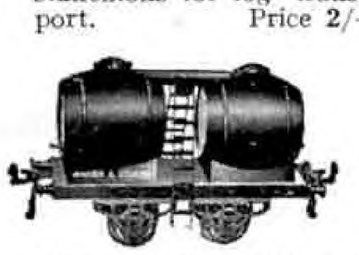
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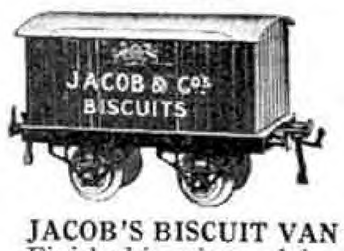
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Fun with Timetable Working

By "Tommy Dodd"

FROM time to time in our H.R.C. pages Branches have been urged to adopt timetable working for their layouts. Very many Branches have taken this advice and in most cases the results have been completely successful. Letters from a few Branches, however, show that timetable working has proved disappointing, and has fallen into neglect or even been abandoned altogether. Recently I have given a good deal of attention to the correspondence with these Branches, and I have come to the conclusion that their poor success in this respect has been due to approaching timetable working in the wrong spirit.

Timetable working means that trains, instead of being despatched in haphazard fashion from one point to another as happens to be convenient, are sent off at definite times according to a pre-arranged plan. No matter how simple such a plan may be, it introduces system into the working, and in so doing adds a new interest to the various operations. The drawing up of a timetable is in itself an interesting process. The first step is to decide upon a few simple train movements to be carried out in succession at certain intervals. These movements are then tested by a series of experimental trips to ensure that they do not interfere with one another, and that the time allowed for each one is sufficient for comfortable working. It will be found that most of these times can be reduced as experience is gained, and it is great fun cutting down the allowance to the minimum, always avoiding any suggestion of a wild scramble.

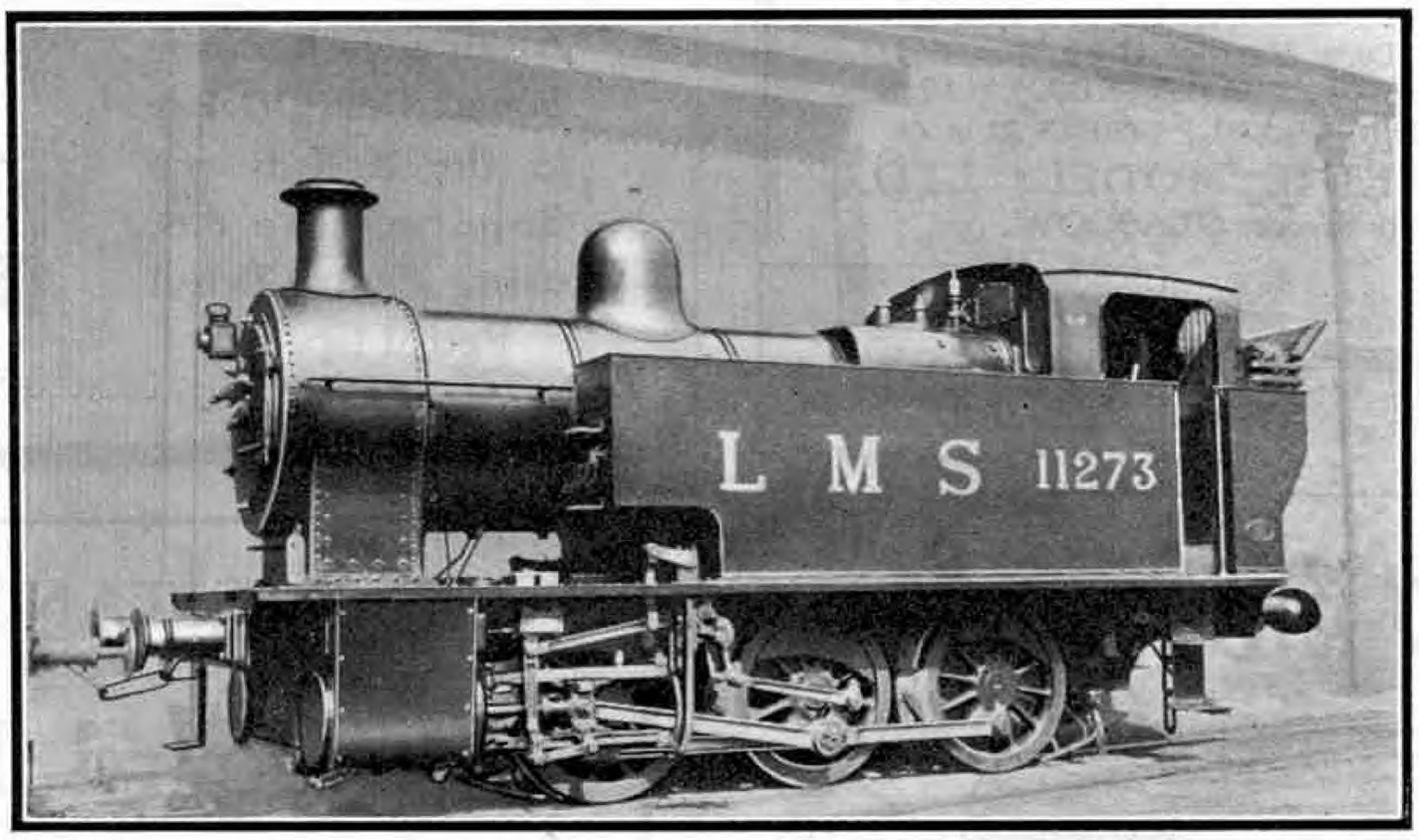


Photo by [*J. J. Cunningham, Annan*

L.M.S. 0-6-0 Shunting Tank Locomotive at Leith Docks. This locomotive is one of a series of 10, specially constructed for Dock and Goods Yard shunting, and capable of negotiating a curve of 165 ft. radius.

When a certain number of train movements have been practised until they can be carried out regularly with smart timing, new trains should be added to the scheme until the total number of train movements occupies half an hour, an hour, or some other definite period that is not too long for regular use. If it is found that the scheme occupies so much time that it is frequently necessary to leave it uncompleted, it should be immediately reduced to more convenient proportion.

Now I come to the point where I think some Branches have gone astray. When a scheme of train movements is first planned out there is no lack of enthusiasm on account of its novelty. If matters are allowed to rest there, however, and the scheme is simply worked through time after time without any variation, interest soon dies away. Enthusiasm can be maintained only by the combined efforts of all members of the Branch concerned to bring about some improvement in running each time the railway is operated.

When an athlete is training for some particular event he does not trust to memory for his times or distances, but keeps careful records. These records enable him to make steady progress by continually endeavouring to improve slightly upon his previous efforts. In a similar manner records must be kept if a model railway is to be brought to the greatest possible perfection; and, what is equally important, if the greatest possible fun is to be obtained from it. Paper specially ruled in suitable columns is required for recording railway movements satisfactorily, and the preparation of the necessary sheets is apt to become a nuisance. During the past few years there have been widespread requests from Hornby enthusiasts for specially printed forms for this purpose, and when the Hornby Railway Company was instituted, in October 1928, a series of five sets of forms was issued. It might be thought that the filling up of these forms would be a nuisance, but as a matter of fact it provides an entirely new interest.

Take, for instance, the "*General Working Timetable*" form. On this are filled in the details of the train movements and the times allowed for each one. These details form a record of the scheme of operations that was carried through at a certain meeting. At the next meeting the scheme may be repeated if it is felt that further practice is necessary, or, on the other hand, it may be developed in some way, either by adding a new train, or altering the arrangement of the existing ones. In any case the new scheme is recorded on a fresh form, and provides a basis for work at the following meeting. In this manner new interest is continually being introduced, while at the same time the operations are always carried out on sound railway-like lines.

Each of the other forms plays an important part in the scheme. Take, for instance, the "*Engineman's Job Card.*" This sets out the various movements that are to be performed by a particular locomotive, and the driver in charge of that locomotive follows out these instructions in detail. In doing so he will probably find that he is not allowed sufficient time to carry out satisfactorily some particular operation, or, on the other hand, that more time is allowed than is necessary. He informs the Superintendent accordingly, and upon his report, and that of the drivers of the other locomotives, are based the changes in working to be tried upon the next occasion. In a similar manner the forms for signalmen and stationmasters add tremendously to the interest of the operations.

It is not suggested that these forms should be used every time the railway is put into operation. On many occasions the proceedings will be informal, or will consist of interesting experiments suggested by different members of the Branch. The time to use the forms is at meetings when the Branch settles down to a really good evening's railway work, and their value on such occasions must be experienced in order to be realised.

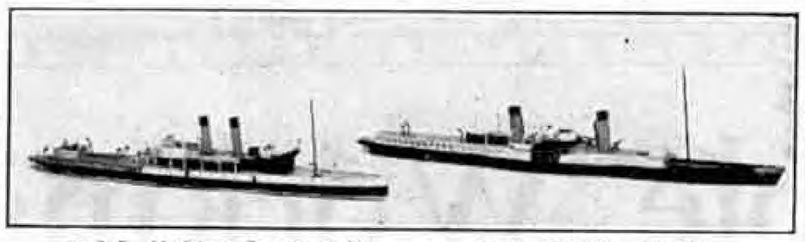
Before leaving this topic I must mention a plan that has been adopted by several Branches, and of which I strongly approve. This is to send in to the Hornby Railway Company Secretary, month by month, a selection of the completed forms that have been used by a Branch, with a request for comments. These forms enable the H.R.C. Secretary to judge whether a Branch is working on sound lines or not, and to indicate weak points and make suggestions for improvements.

I hope these notes will encourage many H.R.C. Branches to make further experiments in timetable working, and I shall be glad to answer queries in regard to difficulties that may arise.

The H.R.C. timetable forms available are as follows:—

G.W.1	General Working Timetable.
S.D.4	Stationmaster's Arrivals and Departures.
S.R.7	Stationmaster's Report Form.
E.J.5	Engineman's Job Card.
S.B.6	Signal-box Instructions.

These forms may be obtained from Headquarters in pads of 50, price 5d. each, post free, or 1/9 post free, for a complete set of five pads. In ordering separate pads the reference letters and numbers of each should be quoted.



T.S.S. " Glen Sannox " P.S. " Columba "

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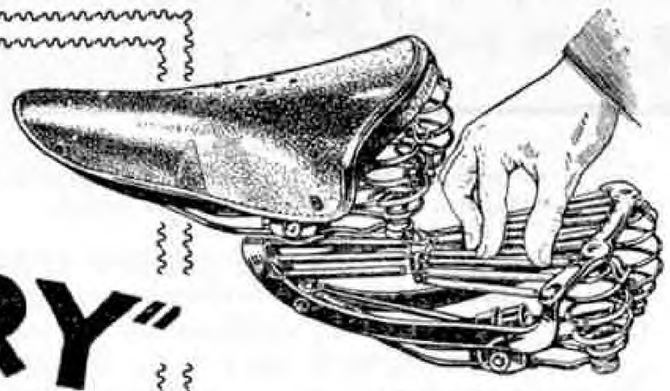
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ELASTIC-DRIVEN SPEED-BOAT (M4), **beautiful hollow-built model** with cockpit and wind-screen, very fast, 17 ins. long, with novel quick-winding gear, fully wound in ten seconds ... ... Price **7/-**

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No. 1, fits any shape of boat, need not be flat, hand-driven through long flexible shaft, a fine gadget for races when paddling or bathing. (M5) Price **3/-**

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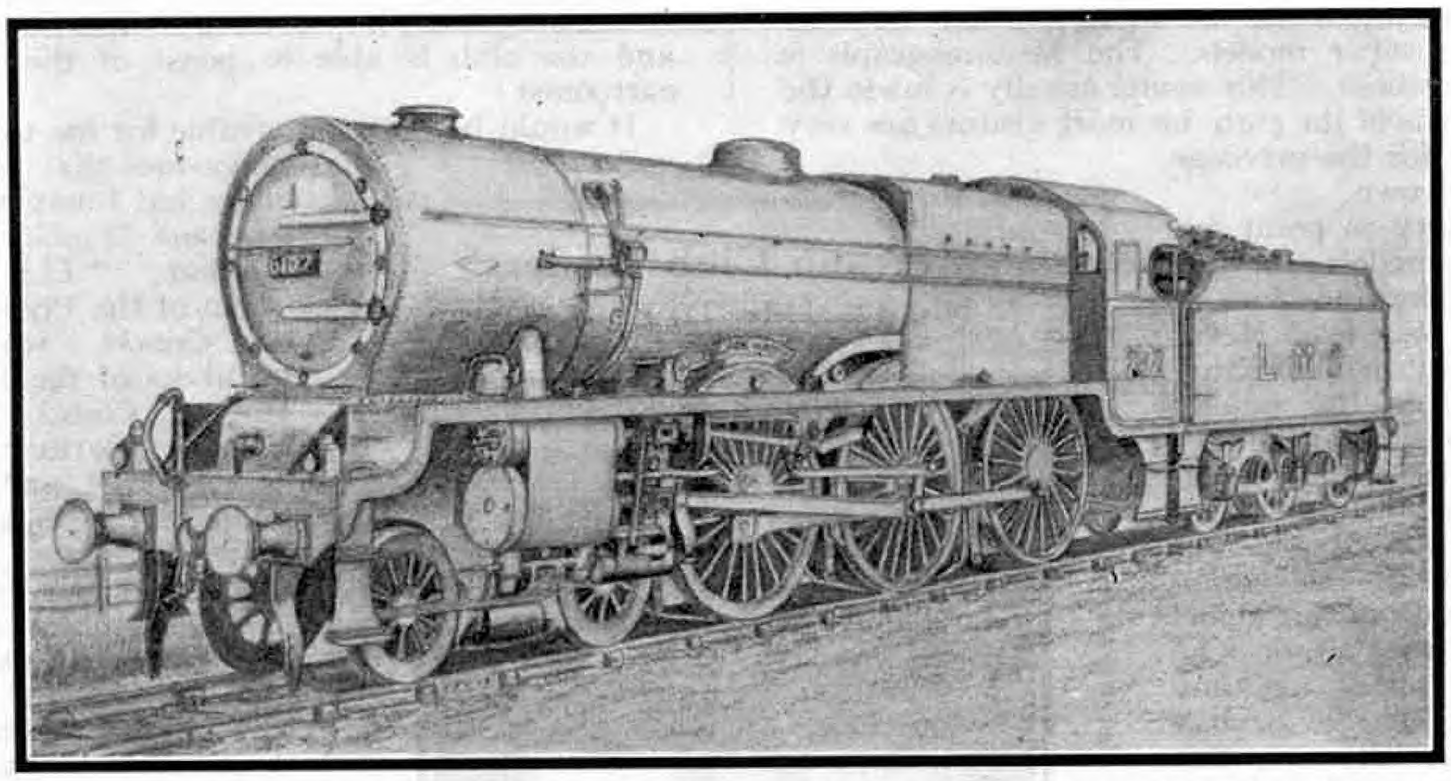
H.R.C. COMPETITION PAGE

How Would You Plan a Hornby Railway?

Competitions appearing on this page are open only to members of the Hornby Railway Company. Envelopes containing entries should have the title of the competition clearly written in the top left-hand corner and should be addressed to the Hornby Railway Company, Binns Road, Old Swan, Liverpool. The name, address and membership number of each competitor should appear in clear writing on every sheet of paper used.

The average H.R.C. member is a progressive individual. Whatever the size of his miniature railway he always sees greater possibilities ahead. Perhaps space for a permanent layout is not available, and he must lay down his track anew every time he wishes to operate his miniature railway. In that case he looks forward to the day when he may fix his rails and points on a baseboard to be placed in a corner of the room, and group round them a few of the many accessories that help so greatly to give railways a good appearance.

The member who is fortunate enough to have reached this stage dreams of the wonderful miniature railway he will make when an entire room is at his disposal. In many cases his ambition does not stop there! He imagines a splendid hut in the garden that provides him with sufficient space in which to plan a large layout to be run on approved railway lines, and to which extensions may be made from time to time in order to make its operation even more interesting.



This splendid drawing of L.M.S. Locomotive No. 6102 "*Black Watch*," of the "Royal Scot" class, secured first prize in the December Drawing Contest for J. C. Moncrieff (H.R.C. No. 4599) of Jeanfield, Perth.

We should like to learn something of the manner in which members would plan expansions of their miniature railways. For our competition this month, therefore, we ask them to imagine that they have the use of a room or shed, 15 ft. in length by 12 ft. in width, and we wish them to design a layout suitable for it.

It may be assumed that the track is to be mounted on a baseboard supported on trestles, in the manner described on page 320 of the "*M.M.*" for April last, and apart from the size of the room there are no restrictions whatever. It may be supposed that there are no obstacles such as cupboards in the room, except any that may be introduced as part of the scheme, and that sufficient material to build up a really good layout is available. What is wanted is a carefully-planned layout, drawn to scale in order to ensure its practical character.

One word of warning should be given; the prizes will not be awarded to the largest layouts, or to those that are planned on the most expensive scale. Competitors also should not overlook the necessity for providing operating space and generally looking after the comfort of the fortunate owner of the railway that they design. Their drawings should be accompanied by brief statements of the services that would be operated on the layouts shown, and it is important to note that accessories such as tunnels, signals, etc., should be ignored.

This competition will be divided as usual into two sections—Home and Overseas. In each of these the sender of the layout that is judged to be the most practical and to offer the best means of realistic operation will be awarded a prize of Hornby Train goods (or Meccano products, if preferred) to the value of 21/–. For the three entries in each section that are next in order of merit similar prizes of value 15/–, 10/6, and 5/– respectively will be given. A number of consolation prizes also will be awarded to competitors whose efforts are next best.

Envelopes containing entries in this contest should be clearly marked "H.R.C. Model Railway Planning Contest" in the top left hand corner, and posted to reach Headquarters at Binns Road, Old Swan, Liverpool, on or before 30th June. Overseas closing date is 30th September. On his entry each competitor must give his H.R.C. number.

Railway Photographic Contest

In spite of the bad reputation of our climate, we are quite convinced that during June a sufficient number of fine sunny days will be enjoyed to tempt members to make full use of their cameras. Naturally they will devote a large proportion of their plates and films to railway subjects, and as we should like to have an opportunity of seeing their results, this month we offer prizes for the most interesting railway photographs submitted.

The prizes will be awarded to the competitors whose prints are the most interesting from a railway point of view. Technical excellence will only be taken into consideration in making final decisions.

The Contest is divided into the usual two sections—Home and Overseas—and Hornby Railway material (or Meccano products if preferred) to the value of 15/–, 10/6, 5/– and 2/6 will be awarded to the senders of the best photographs submitted in each of these. Prints only must be sent and the envelopes containing them should be clearly marked "Railway Photographic Contest" and posted to reach H.R.C. Headquarters on or before 30th June. Overseas closing date, 30th September.

H.R.C. Competition Results

"HOME"

April "1950 Locomotive" Contest. First: J. W. Lowe (9030), Port Talbot. Second: W. A. Spurr (2161), Kegworth. Third: J. T. Trotter (11447), London, S.E.21. Fourth: K. C. Crowe (8161), London, N.W.10. Consolation: W. Oliver (8526), Glossop; H. Loader (353), London, S.W.16.



With the Secretary

A Useful Exhibition Model

In the past I have often urged the use at Exhibitions held by Meccano clubs of certain super models. The Meccanograph is perhaps the best known of these. This model usually is made the means of adding to the funds of the club, for most visitors are very pleased to pay a small fee for the privilege of making a design of their own.

To-day it is not necessary to point out the value of working models of this kind, and there are very few functions at which working models on loan from Headquarters, or constructed by members, are not on view in addition to the smaller models entered in various competitions. One model that I may confidently recommend for the purpose is the Meccano Bagatelle Table, the construction of which is fully described in Special Instruction Leaflet No. 9. The ingenuity of this model makes it very attractive to visitors, who are fascinated by the almost uncanny certainty with which the marble or ball automatically is returned to the operating point after each "shot."

As is the case with the Meccanograph, the Meccano Bagatelle Table may be made a source of income and thus is suitable for use as a side attraction at an Exhibition. For this purpose it may be employed in various ways. A good plan is to make a small charge for three shots, and those scoring above a certain number may be awarded a small prize. Other methods will readily be thought of by club officials, who also should not overlook the value of the model in providing amusement for members. Games and tournaments on a Meccano Bagatelle Table built as a club model may well form part of the regular programme.

Meccano Club Magazines

A striking feature of the past winter has been the increase in the number of Meccano clubs that have produced magazines. This is a phase of club life that I should like to see developed even further, for nothing seems to encourage the club spirit more than the production of a record of activities, such as a magazine only can give. In practically every case in which publication of a magazine has been commenced, this has increased in size and also become more interesting.

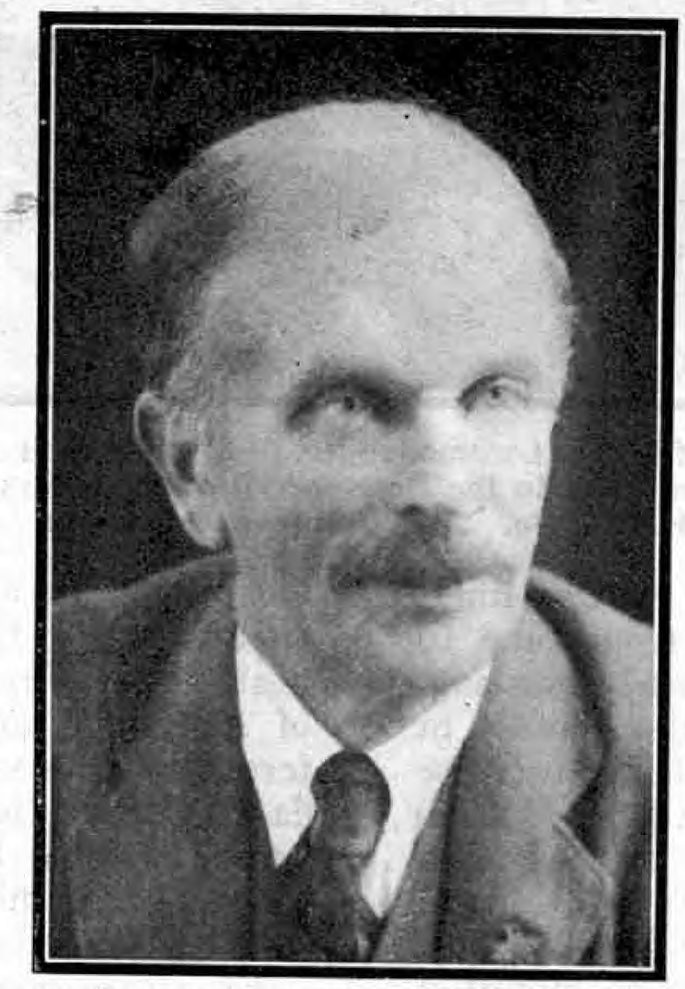
An excellent instance of the growth of a magazine is given by "*The White Triangle*," the organ of the Exeter M.C. This commenced its career more than three years ago as a small written production, with a few rough drawings in its pages. Later a typewriter was obtained and the general appearance of the magazine improved by its employment. This was followed by the use of a well-designed printed cover, on which space is left for the date, and also for a photograph of interest to members of the club. On the cover of one issue, for example, appears a portrait of the Leader, and on another a group photograph of one of the football teams connected with the club. The contents of the numbers now issued are greatly improved in comparison with those of early issues, and the club is able to boast of the possession of a talented cartoonist!

It would be quite impossible for me to refer to all the excellent magazines that are published by Meccano clubs, but I may mention the "*Middlesboro' Meccano Monthly*," a really splendid production; "*The Gear Box*," the official organ of the Plymouth club; and "*Strips and Cranks*," which is circulated among members of the Herne Bay Meccano and Hobbies Club. Many excellent productions necessarily must remain unnamed for lack of space, and I hope to hear of others published in connection with clubs that previously have not issued a magazine.

I should like to suggest that clubs producing magazines should exchange publications in order to stimulate friendly rivalry and interest in each other's activities. This is already done by certain clubs, and it is very interesting to read the critical but kindly comments editors and contributors make on rival productions! In some cases lengthy debates on subjects of interest to members of both clubs have been carried on through the medium of the magazines. There is plenty of room for extension of the scheme, and I should be pleased to hear from the secretary of any club wishing to take part in it, and in return to send a list of clubs willing to exchange publications.

Meccano Club Leaders

No. 44. Mr. D. E. Tower



Mr. Tower is the energetic Leader of the Pershore M.C. This club was affiliated in May, 1926. The programmes arranged by Mr. Tower and the officials of the club are full of variety and interest. A special feature is made of Boxing, and the members are very enthusiastic in regard to this sport.

Correspondents Wanted

Last month I referred to the lasting value of friendships formed through the medium of the Correspondence Club. The pleasure of exchanging letters with friends abroad is available for all Guild members, and I advise those who have not yet joined the Club to consider doing so at once. Meccano enthusiasts living in almost every interesting country in the world are waiting for pen friends of similar tastes with whom to exchange news and to share the enjoyment of hobbies such as stamp collecting and photography.

Proposed Clubs

Attempts are being made to form clubs in the following places, and boys interested should communicate with the promoters, whose names and addresses are given below:—

BIGGLESWADE—B. J. Lewis, 43, London Road.
BRADFORD—F. Rhodes, 113, Park Row, Heaton Road.
PURLEY—G. Green, 4, Foxley Hill Road, Purley.
SYMINGTON—R. G. F. Paton, One Ash, Symington, Ayrshire.
WELNEY—R. Ray, School House, Welney.
WOLVERHAMPTON—F. Mann, 25, Queen Street, Wolverhampton.



CLUB NOTES



Wolverley School M.C.—In a "Simplicity" Model-building Competition the First Prize was awarded to the constructor of a model of the Molten Metal Car illustrated on page 14 of the "*M.M.*" for January 1930. In a Senior Competition the winning model was a Scenic Penny-in-the-Slot machine, in which the insertion of a penny caused the appearance of three ghosts! The winner of the First Prize in the Junior Competition built a representation of a Picture Theatre, and many other ingenious models were exhibited by members. Club roll: 36. *Secretary*: W. F. G. Gadsby, Bury Hall, Wolverley School, Kidderminster.

Streatham and District M.C.—A feature of the work of this club is inspection and criticism of models. Every member may take part in the discussions and interesting suggestions for improvement usually are made. Talks have been given on "*Famous Bridges*" by Colonel Bradshaw, and on "*Elementary Magnetism*" by the secretary. Visitors' Night was well attended. A large number of models made by members were displayed, together with a Meccanograph loaned from Headquarters. Club roll: 58. *Secretary*: Mr. F. J. Stowe, 17, Greyhound Lane, S.W.16.

Roe Green M.C.—Members have constructed a permanent Hornby Train Layout, and have devoted special attention to the building of models for use in connection with it. Model-building Competitions continue to be keenly contested. Cricket and Cycling have been taken up with enthusiasm and an Outdoor Treasure Hunt also has been held. A larger club room is required and the secretary will be pleased to hear from anyone who can help in securing one. Club roll: 14. *Secretary*: P. J. Wallis, 1, Elmwood Crescent, Hey Lane, N.W.9.

Marlowe (Wallasey) M.C.—Has now secured affiliation. Monthly Model-building Competitions have been instituted. In these members compete in two sections, Senior and Junior, and Meccano parts are awarded as prizes. A very enjoyable visit was paid to the Meccano factory in Liverpool. Club roll: 22. *Secretary*: R. E. Scovell, 73, Poulton Road, Wallasey.

St. Alban's M.C.—A Lecture on "*A Visit to the Battlefields in France*" was given by a member, and a discussion was held on the history of St. Albans. One meeting ended earlier than expected and in order to fill in the remaining period members chosen by lot were required to entertain the club. An exciting Tennis Tournament was held and an interesting novelty was a Blindfold Model-building Competition, in which entrants were required to construct models without seeing their work. This caused great amusement, but many surprisingly good models were built. Club roll: 15. *Secretary*: T. F. Biggs, Hammonds End, Harpenden, Herts.

Sutton Bridge M.C.—Senior and Junior Sections have been formed. Members of the former built a model of the Transporter Bridge, and a Travelling Crane has been constructed by the Juniors. When displayed with the affiliation certificate in a local shop window these attracted much interested attention. A Lecture on "*Gardening*" was given by Mr. A. Beaven. Club roll: 12. *Secretary*: F. E. Scales, 18, Wharf Street, Sutton Bridge, Wisbech.

Elm Road (Beckenham) M.C.—Moving pictures were displayed of Southern Railway scenes taken by a member with the aid of a Ciné-Kodak, those showing the rebuilding of Wimbledon Station proved specially interesting. After a Debate on "*Aeroplanes v. Airships*" members decided by vote that the former were more useful and reliable. A Lecture on "*The Building of a Tube Railway*" was illustrated by splendid slides kindly loaned by the Underground Railway Company. Visits have been paid to the local Gasworks and a Creed Teleprinting demonstration. Hornby Train Nights have been organised, and on one of these elaborate track circuiting and electric signalling arrangements were made. Club roll: 15. *Secretary*: C. W. Price, 52, Queens Road, Beckenham, Kent.

Wimbledon M.C.—Games Nights, Lectures, and a Mock Trial have alternated with Model-building Evenings. The second Annual Exhibition was opened by Councillor G. T. Burrows, J.P., Mayor of Wimbledon, the Rev. A. W. R. Dunstan, President of the Club, taking the chair. The exhibits included models of Bridges, Cranes, and Motor Cars; two that attracted special attention from visitors were a Flash Signalling apparatus and an Automatically-Driven Traffic Control Signal. Club roll: 24. *Secretary*: M. O'Carroll, 34, Drax Avenue, Wimbledon, S.W.20.

Whitgift Grammar School M.C.—Enjoyable visits were paid to the Royal Mint and the London Docks. An Exhibition was held at the School, and in the organisation of this members of the Whitgift Middle School M.C. kindly assisted. Many splendid models were exhibited by members of the two clubs and others were loaned by local dealers. Guessing Competitions, an Electric Shocking Coil, a Penny-in-the-Slot machine, and the Electric Game described on page 137 of the February, 1929, "*M.M.*" brought in good sums, and proceedings ended with the Lecture "*The Story of the London Omnibus*," slides for which were kindly loaned by the L.G.O.C. Club roll: 31. *Secretary*: R. Hall, 55, Kendall Avenue South, Sanderstead, Surrey.



The members of the Pharos (Dover) M.C., a group of whom is shown above, attend the Dover County School for Boys. The club was affiliated in October, 1929, and under the able Leadership of Mr. A. E. Coulson, who in our photograph is seated in the middle of the front row, quickly established itself as a valuable School institution.

St. Mary's (Mistley) M.C.—Well-contested Model-building Competitions and interesting Contractors' Nights have been held. A Stamp Section and a First Aid Class have been formed, and interesting talks have been given on hobbies. Club roll: 12. *Secretary*: K. R. Brasnett, 1, Stour Terrace, Mistley, Essex.

Braintree High School M.C.—A series of Model-building Contests have attracted full entries. At a "Magazine Meeting" three articles were read. One of these was Mr. Frank Hornby's account of "*A Tour Round the World*," and the others dealt with "*Staffing a Liner for a World Cruise*" and "*What a Railway is.*" In an interesting Debate the resolution "*That Collecting is the best form of Hobby*" was carried by a large majority. Lectures on "*Gas*" and "*Transport*" were followed by interesting discussions. Outdoor sport is being organised and the football team has played several matches. Club roll: 20. *Secretary*: P. Allen, St. Edmunds, Bocking, Braintree.

Leas (Hoylake) M.C.—Interesting Lectures have been given by the Leader on the important parts of a motor car engine. This club's members, either alone or in groups, complete large models, and demonstrate their construction and use at club meetings. Models dealt with in this manner have included Revolving and Derricking Cranes, Pit Head Gear, and a large Boat. A Talk on "*Sea-fishing*" given by two members was very instructive, the speakers showing how lines and tackle of various kinds should be used. Club roll: 58. *Secretary*: J. F. Barnes, The Leas, Hoylake, Cheshire.

Whitstable M.C.—Model-building and Stamp Competitions have been organised, small prizes being given to the winners in each contest. The secretary has commenced a series of Talks, the first two dealing with "*Rails*" and "*Bridges*" respectively. Hornby Train Nights have been arranged. A track is being laid down and trials of locomotives have been conducted. Club roll: 33. *Secretary*: L. Dale, 77, Albert Street, Whitstable, Kent.

Sketty (Swansea) M.C.—An Exhibition of models was held in order to celebrate affiliation to the Meccano Guild. A Hobbies Night was held, members being divided into groups who championed their favourite indoor recreations. A Hornby Railway Layout has been designed and work on its construction commenced. Club roll: 21. *Secretary*: A. Temlett, "Wilscombe," Haslemere Road, Sketty, Swansea.

Australia

Sutherland M.C.—Members have carried out constructural alterations to the club room in order that they may extend the Hornby Train Layout. A Lecture Night and Model-building Evenings devoted to special types of structures have been held. At a Mock Trial the culprit was a member who had "assaulted" a colleague during a club meeting. A Paperchase has been held and other outdoor games arranged. Club roll: 10. *Secretary*: P. O'Connor, Tamar St., Sutherland.

Egypt

Sphinx (Cairo) M.C.—Visits have been paid to factories in Cairo. A Radio Section has been formed and members have constructed a powerful Receiving Set. Model-building continues to be the chief activity and several competitions have been held. Club roll: 17. *Secretary*: Abdel-Hamid Amin, 17, Gamé El Isamili St., Nasria, Cairo.

Clubs not yet Affiliated

Douglas (Isle of Man) M.C.—Good progress is now being made under the able guidance of the Leader, Mr. H. Cain. Several books and outfits for indoor games have been presented to the club, and enjoyable meetings for model-building and other purposes have been held. *Secretary*: F. Pascoe, 6, Crosby Terrace, Douglas.

Hebden Bridge Secondary School M.C.—Talks on the "*Petrol Engine*" and the "*Steam Engine*" have been given, and a particularly interesting Lantern Lecture on "*Aviation*" was delivered by one of the members, the slides used having been prepared by the lecturer himself. A visit was paid to the premises of a local Meccano dealer, who made special displays of Meccano and Hornby Train goods, and an extensive Hobbies Exhibition was held at the school. Leader: Mr. H. O. Walker, "Summerfield," Hebden Bridge.

Laindon M.C.—Members meet on Saturday afternoons for Model-building and Hornby Train operation. A club Layout has been fitted up and good practice in shunting obtained. A Meccano Model-building Exhibition was organised, the prize-winners being awarded entry into the Guild or the H.R.C. from the club funds. *Secretary*: J. P. Tourle, "St. Ives," Leicester Road, Laindon, Sussex.

Waterloo and Crosby M.C.—A club room has been secured and a Leader and President elected. Meccano and Hornby Train Nights have been held with success and a Games Night also proved very enjoyable. More members are required and the secretary will be pleased to hear from any boys who wish to join. *Secretary*: P. Modridge, 25, Ilford Avenue, Great Crosby, Liverpool.

New Zealand

Waikaka Valley M.C.—Debates, Contractors' Nights, and visits to places of interest have figured on the programme. The visits were particularly interesting, these being made to a local printing office and the works of a coal prospecting company. *Secretary*: W. Smith, Gore Waikaka Road, Southland.

Another WARNEFORD Success

GAMAGE CUP, 1930

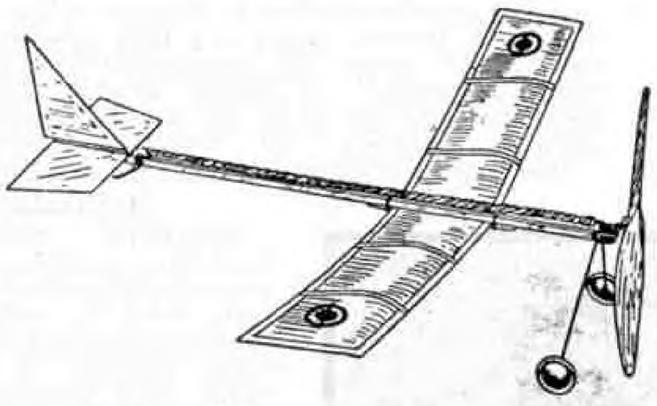
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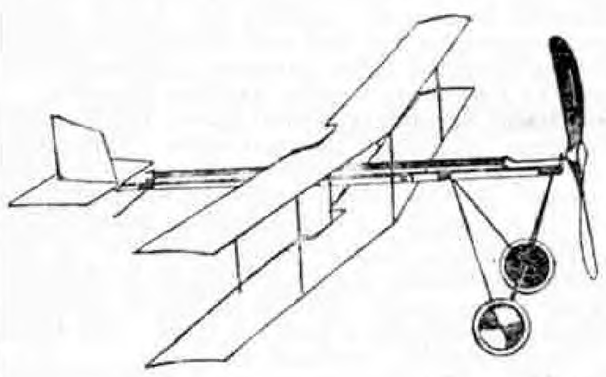
Sole Manufacturer: F. J. MEE, 137a, Greenwich Road, LONDON, S.E.10

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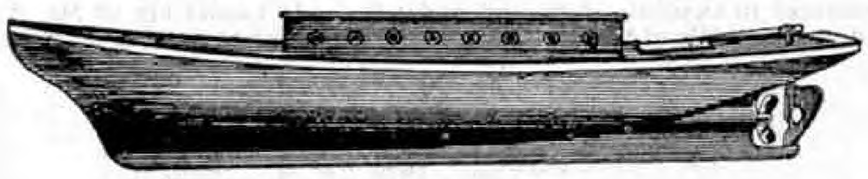
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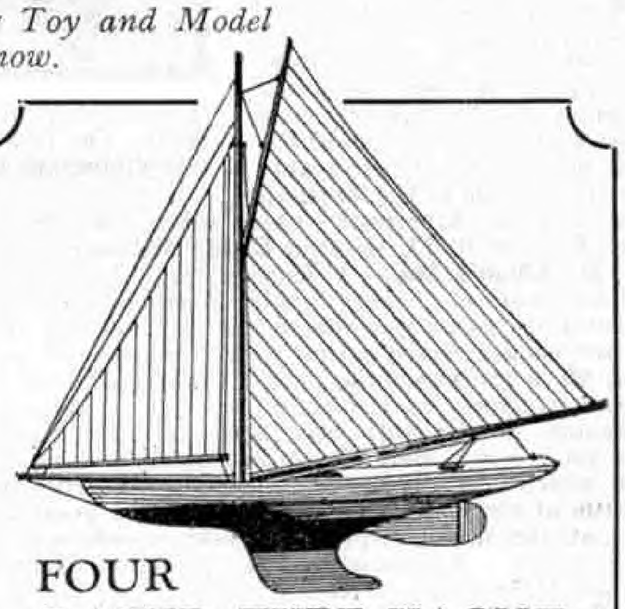
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Competition Page

WHO SHOULD GUARD THE "ASHES"?—CRICKET VOTING CONTEST

If there is one thing upon which the average sports enthusiast expresses himself more freely than another, it is the composition of representative sides, particularly those representing his country. It seems certain that the most hotly discussed cricket topic of 1930, therefore, will be the composition of the English team to resist the Australians' challenge for the "Ashes." No eleven but our best will be good enough, for the Australians are a really formidable side in everything except, perhaps, bowling; there is apparently a doubt about the strength of this department. Their batting is exceptionally strong, and their fielding is considered almost perfect.

Strangely enough, the probabilities are that the best available English side will match the Australians in the strength and weakness of its qualities. Of our batting strength there can be no question; our fielding, too, ought to be perfect; but what of the bowling? Larwood is a doubtful starter; neither Geary nor Root present any great difficulties to a batsman of Test quality; Freeman and White are not as young as they were (and to-day the energy of youth is more than ever necessary in the stubbornly fought Test Matches); Tate is still a match winner, but he, too, is not the force that he was a few seasons ago.

The all important question of Captaincy, too, presents problems, for the post will certainly be filled by an amateur. A. P. F. Chapman has the moral advantage of having achieved the winning of two rubbers, but he would be the last to claim a place in the side on anything but real merit. On the top of his form he ranks with England's greatest batsmen and in the field he gives nothing away. Unfortunately, he has not touched his best in recent years. But there are to be considered J. C. White and P. G. H. Fender, to mention but two great Captains of test match calibre, and they are worthy rivals for the honour.

Summing up, it will be seen that there is enormous scope for diverse opinion in the selection of England's best eleven, and we have decided to give Meccano boys an opportunity to express their views by holding a voting contest to decide:—

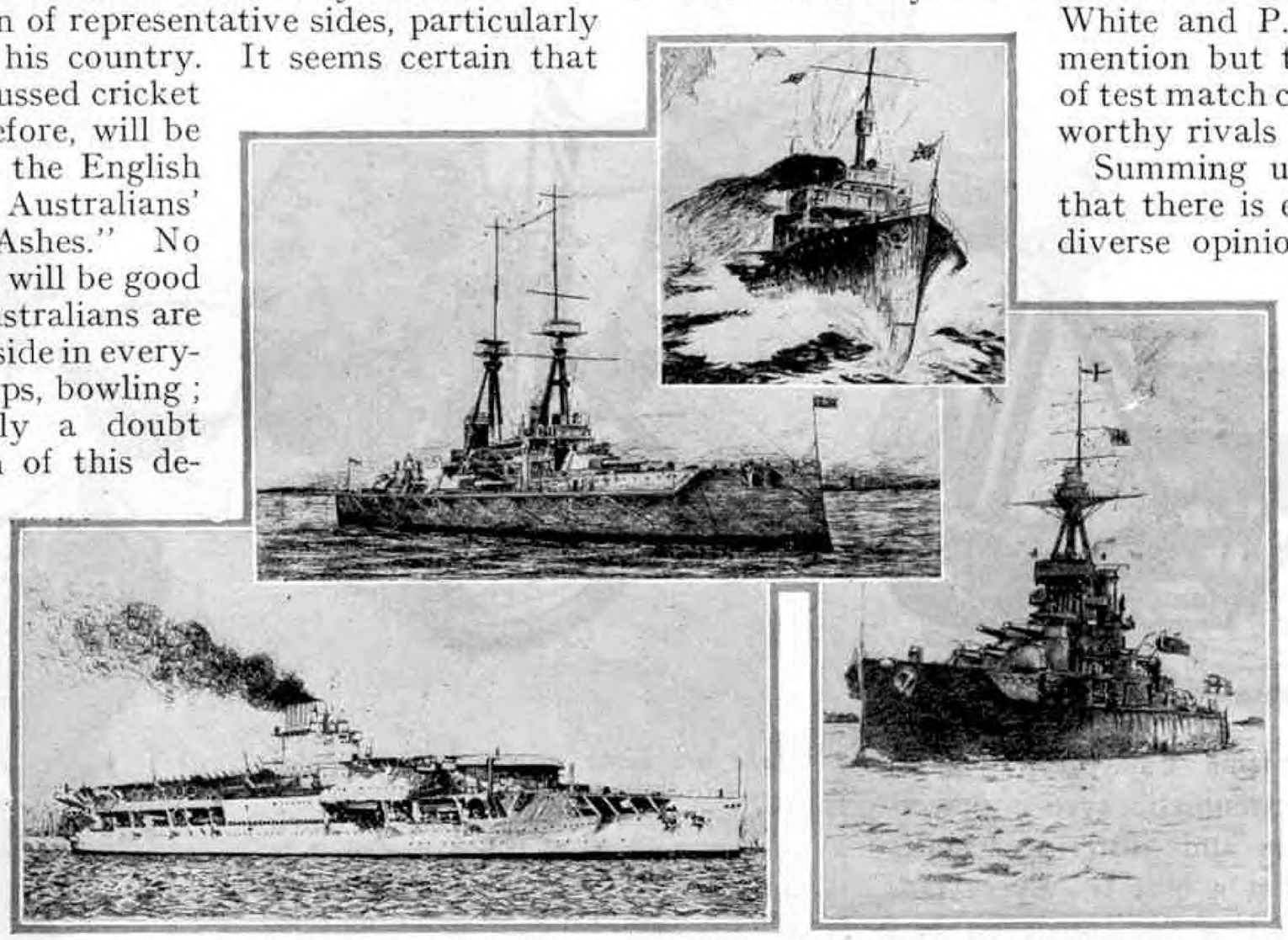
(a) Who would be England's best captain.

(b) What would be England's best eleven.

Prizes of Meccano or Hornby Train Products to the value of 21/–, 15/–, 10/6 and 5/– respectively will be awarded to the four entrants whose captain and team correspond most nearly to the popular choice as determined by the massed voting of all the competitors. In addition there will be a number of consolation prizes for entries next in merit.

It is unnecessary to answer the two questions separately. It will be sufficient to head the team with the chosen Captain and to write "Captain" against his name. Entries must be written on post cards and no competitor may submit more than one entry. In the event of a tie for any of the prizes, neatness and novelty of presentation of the tying entries will be taken into consideration.

Post cards must be sent to reach this office not later than 30th June, and should be addressed to "Test XI Contest, Meccano Magazine, Binns Road, Old Swan, Liverpool." Overseas closing date: 30th September.



A selection of winning drawings from the 30th Drawing Contest, the result of which was announced last month. Taking the drawings from left to right the artists' names are as follows:—O. A. Kimmings (East Acton), A Section; R. C. Randall (St. Albans), A Section; H. Button (Lutterworth), B Section; N. Alford (Carlisle), B Section.

Unfortunately, other of the winning entries—notably the first prize winners in Section A—will not reproduce well and, therefore, cannot be published.

June Photographic Contest

In accordance with the announcement in our last issue, our photographic contests this year do not require competitors to submit photographs of any special subject, and the monthly contests are simply for the best photographs submitted each month, irrespective of their subjects.

The entries to the competitions will be divided into two sections, A for those from readers aged 16 and over, B for those from readers under 16. Prizes of photographic materials or Meccano products (to be selected by the winners) to the value of 21/– and 10/6 respectively will be awarded to the best and second-best entries in each section.

Each competition will be known under the name of the issue in which it is announced. Thus all entries sent this month should be addressed to "June Photo Contest, Meccano Magazine, Binns Road, Old Swan, Liverpool." They must reach this office not later than 30th June. Overseas, 30th September.

Photographs will be returned if a stamped addressed cover is sent with the entry.

COMPETITION RESULTS

HOME

Cricket Bat Competition.—The winner of the Cricket Bat Competition is S. J. Tucker, "Birklands," Horsell, Woking.

A detailed review of the competition and the names of the consolation prize winners will be published next month.

April Photographic Contest.—First Prizes: Section A, G. S. Parker (Southampton); Section B, R. L. Stubbs (Sydenham, S.E.26). Second Prizes: Section A, D. E. Watts (Hoylake); Section B, M. MacDonald (St. Andrews, Fife). Consolation Prizes: P. Cook (Northwich); J. W. Hague (Ripon); J. Murray (Southampton); W. S. Purves (Carlisle); H. Spooner (Grays); D. R. White (Hayward's Heath).

come on you chaps!



Look at this Fairycycle! With balloon pneumatic tyres; powerful brakes and glittering handlebars—what a bike! Every possible detail of equipment on her. Dunlop balloon tyres for solid comfort, tangent spoke wheels with glittering plated rims; bell, pump, tool bag with real tools; stand, so that she stays upright when not in use, and carrier for the mater's parcels. Moreover, any Fairycycle can be fitted with a flat plate between the saddle and the handlebars showing a realistically painted motor cycle engine. This is Model 8.

Here are some of the more popular Fairycycle models:—

Model A.—Well finished in black cycle enamel, ball-bearing pedals and plated handlebars. Dunlop saddle, 12in. tangent spoke wheels, ⅝in. rubber cushion tyres - **29/6**

Model Ax.—Like Model A, but larger size, with 14in. wheels and ⅝in. rubber cushion tyres - - - - **33/-**

Model B.—Very suitable for young children, being light and easy to ride. Has 12in. tangent spoke wheels with ⅝in. rubber tyres. Complete with chain-guard, reflector, stand and carrier - - **39/6**

Model Bx.—As Model B, but larger size, with 14in. wheels and ⅝in. rubber cushion tyres - - - - **42/-**

FAIRYCYCLE

Besides the models specified above, Fairycycles are made in the following sizes at the prices stated:—

Model C.— Raised pattern plated handlebars, has chain guard, stand, carrier, reflector and bell. Cycle pattern rim brake, 12in. tangent spoke wheels, adjustable ball-bearing hubs, 1in. imitation pneumatic tyres - **49/6**

Model Cx.—As Model C, but larger size with 14in. wheels. **52/6**

Model Px.—As Model Cx, but with 14in. x 1⅜in. Dunlop "Kempshall" pneumatic tyres - - - **55/-**

Model D.—Cycle type brakes, raised pattern plated handlebars, 2-coil spring saddle, etc. ⅜in. x ½in. roller chain, adjustable ball bearings throughout. 12in. tangent spoke wheels with 1in. imitation pneumatic tyres, complete with chain-guard, stand and carrier, reflector and bell. **59/6**

Model 6.—Strongly built for children up to 9 or 10 years old. 16in. tangent spoke wheels, fitted 1in. imitation pneumatic tyres, adjustable ball-bearings throughout, cycle pattern rim brake. Imitation pneumatic tyres, 3-coil spring saddle, tool bag, bell, etc. - - - - **70/-**

Model 8.—The "Rolls-Royce" of Fairycycles, raised pattern plated handlebars, 2¾in. buttress tread Dunlop balloon tyres. Plated ball-bearing pedals, tool bag, carrier, stand, bell, reflector and pump, etc. - - **87/6**

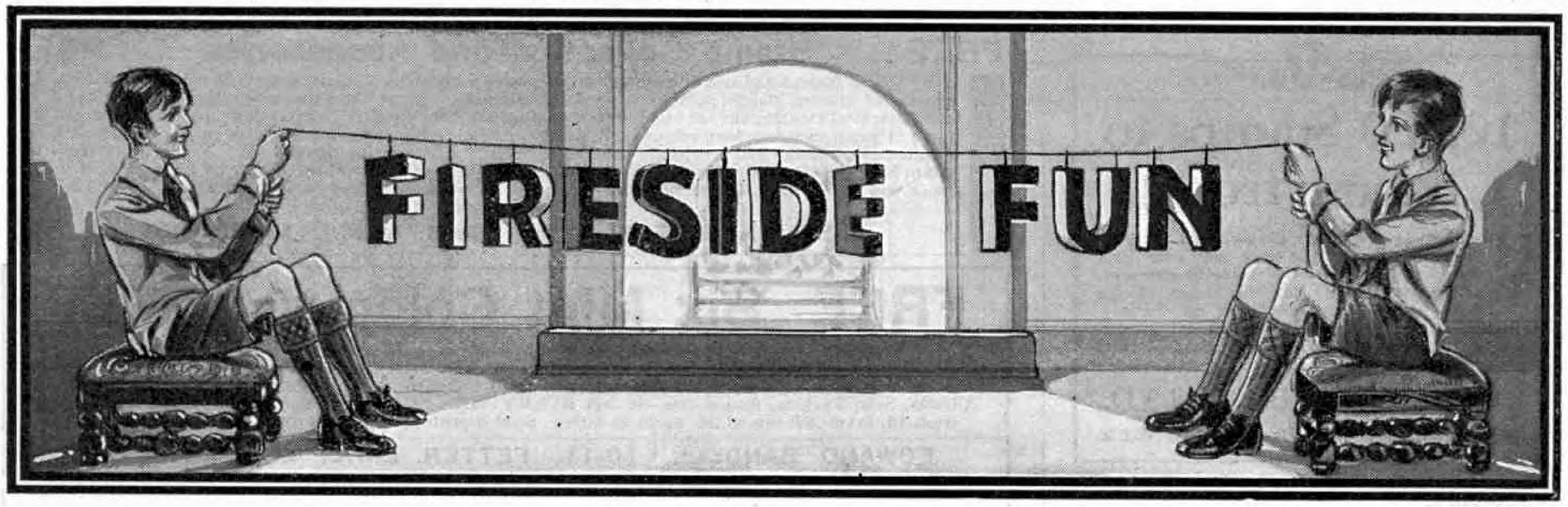
All these models, with the exception of Models A and Ax are finished in black or blue, with gold lines. Fairycycles can be obtained at all good toy shops, or write for illustrated leaflet.

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THE BETTER WAY

Mother: "You must not make all that noise on the stairs—go up again and come down quietly."

Betty went up and came down without making a sound. "Is that better?" she said.

Mother: "Yes, that is the way a little lady should come down the stairs."

Betty: "Well, I slid down the bannisters that time."

* * * *

"I want my hair cut, and a shave, too, please."

"That's 'scissor-ly' seen, sir."

"Drop that vile frivol or I'll go to another barber."

"And 'cut' me!"

"Go on with your work. Is your lather ready?"

"Let's 'soap' so, sir!"

"Do drop your fearful puns, man, and take care of that pimple.

"I presume you would 'razor' row on the 'spot' if I beheaded it, sir?"

"That indeed I should. Thank goodness you've done. There's your money!"

"I thank you, sir, and congratulate you on having got out of the 'scrape' so easily. Next, please!"

* * *

Friend: "Why is it that your son rides in a car while you always go about on the tram car?"

Father: "Well, the reason is that he has a rich father and I haven't."

* * *

Tourist: "How wonderful to see that volume of water tumbling down Niagara Falls."

Guide (bored): "How much more wonderful it would be to see it all going up instead of down."

* * *

Lawyer (to Witness): "You contradict yourself. A short time ago you distinctly said that an incompetent man could keep an hotel as well as anybody?"

Witness: "No, I did not. I said an inn-experienced man could."

* * *

"Pardon, sir," said the waiter to the Professor, "but the money you gave me for your bill includes nothing for the waiter."

"Oh, no, of course not, but I didn't eat one, did I?" said the Professor, glancing up from his book.

* * * *

"What was the trouble at the house the complaint came from yesterday?" asked the manager of the gas works.

"Nothing much," replied the inspector. "I found a centipede in one of the pipes."

"Ah! an extra hundred feet," replied the manager. "See that they are charged for it."

* * * *

An old man was smoking in the waiting-room of a railway station. A porter said to him: "Don't you see that notice on the wall—'No Smoking Allowed?'"

"Yes, I do," said the man, "but how can I keep all your rules? There's another that says: 'Use La Beauté Face Powder.'"

* * * *

Shouting had been going on behind the closed door of the under-manager's office for quite ten minutes. The managing director was getting tired of it.

"What's all the noise about?" he inquired of the clerk.

"Mr. Brown is talking to London, sir."

"Then why on earth can't he use the telephone?"

A CRUSHING REPLY

The play was over when a man in the stalls made a startling discovery. Turning to his neighbour, he said indignantly "You've been sitting on my hat. It's ruined."

"I am very sorry," the other replied, "but keep calm, it might have been worse."

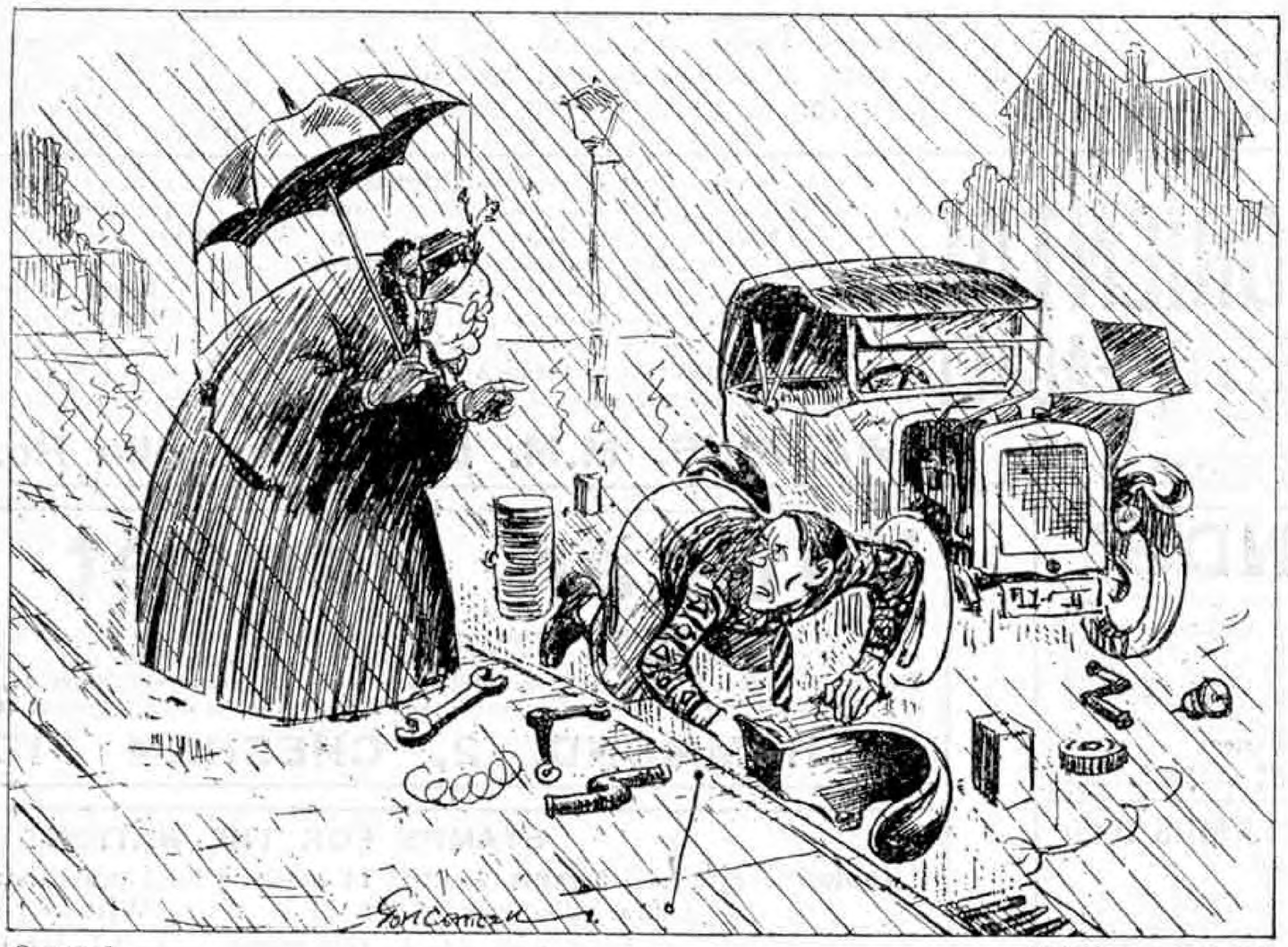
"How might it have been worse?" exclaimed the first man.

"I might have been sitting on my own," came the reply.

* * * *

Motorist: "How far is it to Sticombe?"

Pedestrian: "About 24,999 miles the way you are going: about one mile if you turn round."



Courtesy ["*Motoring Outlook*"

Well-meaning old lady: "Wouldn't you be more comfortable if you took your Meccano indoors?"

"It is eminently essential," shouted the political speaker, "that our party should hang together."

"Hang together is right," yelled one of the opposing party.

"I mean," spluttered the speaker, when the laughter had subsided, "that we should hang together in accord."

"That's what I mean," replied the heckler, "and in a mighty strong one, too."

* * * *

Professor: "Mr. Smith, was I going up or down the street when I met you?"

Mr. Smith: "Down."

Professor: "Well, it's all right, then. I must have been home to lunch."

* * * *

"Time flies."

"You can't. They go too fast."

* * * *

Car Salesman: "And is there anything else I can show you about this new model?"

Young Lady: "Yes; please show me how to turn on the radiator if the car gets cold."

* * * *

"I wasn't doing forty miles an hour," protested the speed-merchant, "or thirty, or even twenty."

"Hold on," interrupted the judge. "Issue a summons against that man for travelling backwards."

GOOD REASON FOR MODESTY

A naval officer had fallen overboard, and was rescued by one of the sailors. When he had thoroughly recovered he said, "To-morrow morning, before all the crew, I will thank you for saving me."

"Don't do that, sir," the sailor replied. "If you do they'll half kill me."

* * * *

She had insisted on taking innumerable dresses with her, and they arrived at the station loaded with luggage.

"I wish," said the husband, thoughtfully, "that we'd brought the piano."

"You needn't try to be sarcastic," came the frigid reply. "It's not a bit funny."

"I'm not trying to be funny," he explained sadly. "I left the tickets on it."

* * *

School Board Officer: "Why haven't you sent your son Johnny to school? Don't you want him to learn to read?"

Proud Father: "It hain't necessary now that we have the talking movies."

* * *

"And waiter," added the fussy old gentleman, after giving a lengthy order, "have my chops lean."

"Yes, sir. To which side, sir?"

* * *

Doctor (to farmer's wife): "Your husband is not getting on as well as he should, Mrs. Brown. Are you giving him plenty of animal food as I told you?"

Farmer's Wife: "Oh, yes, sir! But I think that's the trouble. He gets the oats down all right, but he can't manage the chaff nohow!"

* * *

The circus proprietor wanted to engage a dwarf for the side-show, and an agent had assured him he could get him the very man.

"And you're sure he's a real midget?" inquired the showman.

"Midget!" exclaimed the agent, "Why, he's so short that every time his feet hurt, he thinks he's got toothache!"

* * * *

A "humorist" was seated at the door of his lodging when Sandy, his landlord, came up driving a big, fat pig.

"One of your great relations, I suppose, Sandy?"

"No," quietly retorted Sandy, "no relation at all, sir; just an acquaintance like yerself."

* * * *

Wedding Guest: "This is your fourth daughter to get married, isn't it?"

MacGuffie: "Ay, and our confetti's gettin' awfu' gritty."

* * * *

"How are you getting along with 'rithmetic, Sam?"

"Well, I done learned to add up all the noughts, but the figgers still bother me."

* * * *

John (alarmed): "Don't you feel well?"

Fred: "Yes, I feel all right. Why?"

John: "Why have you got that strange expression on your face, then?"

Fred: "Oh, that's nothing, I'm just thinking."

* * * *

"Ants, we read, can lift weights that are tremendous as compared with their own."

"Wasps also can raise quite good-sized lumps."

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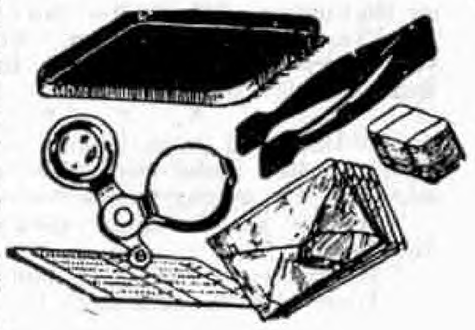
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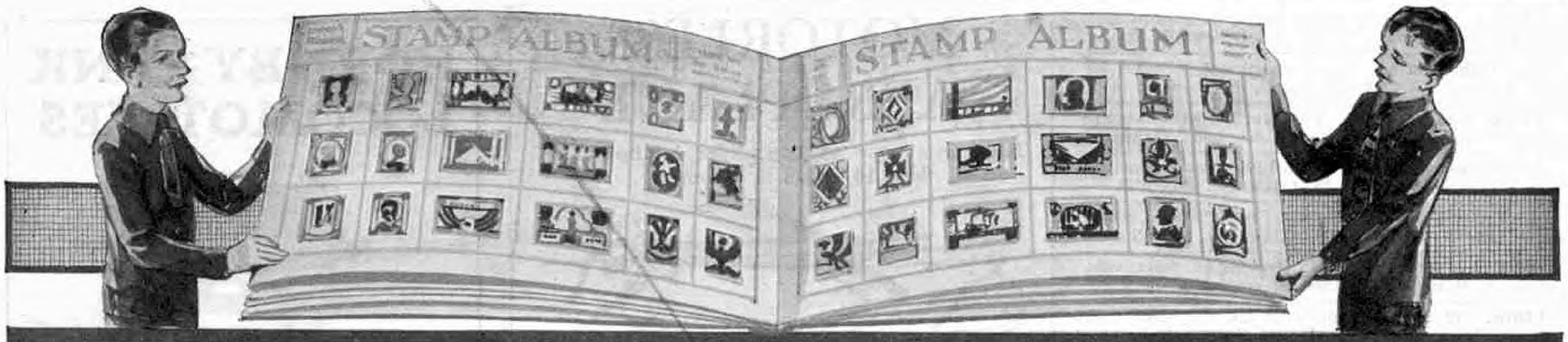


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STAMP COLLECTING

A PAGEANT OF SHIPPING

WE have been intending for some little time past to complete the popular series of Engineering Stamp articles that appeared in the *"M.M."* a year or so ago. There are several outstanding sections and this month we propose to deal with one of the most interesting of them all, the stamp story of ships. Fortunately, a complete illustrated history is available, from the early, almost pre-historic, galleys of the Egyptians and Carthaginians, right up to the most modern of ocean liners. Of course, we cannot deal with all the material that is available, but by sketching briefly the developments, as revealed by the pages of a stamp album, we hope to open up a new and fascinating outlet for collecting enthusiasm.



It is difficult to say just when man first discovered the possibilities of transport by water. Possibly some pre-historic youngster tumbled headlong into a river and, in his struggles, grasped a floating log and found security. His friends, observing the manner of his rescue, probably invented log travel as a new game. Subsequently the idea of digging away a piece of the log to provide a seat was experimented with and thus the native dugout came into existence. Further experiments followed until something was evolved resembling the modern paddle-driven canoe, a good specimen of which is to be found on the current French Guiana series, values 30c. to 1 franc.



Subsequently sails were introduced. Many splendid stamps showing sailing canoes are available for collection, for example, the Papuan issue of 1901/5. This illustrates splendidly the curious sails fitted to the native canoes or *"lakatois."*



Just when sails were introduced is very doubtful, but the illustration used on the Egyptian Navigation Congress issue of 1926, showing a piece of ancient statuary, found in the ruined temple of Deir-el-Bahari, depicting one of the earliest Egyptian galleys fitted with a great main sail on a central mast, suggests that sails were known long before the Flood. Although the sail was used, the principal form of propulsion, of course, was by oars manipulated by a chain gang of slaves.

The 1 franc denomination of the Tunis issue of 1926, illustrated here, gives an excellent picture of a typical Carthaginian galley engaged in trading between Mediterranean ports. This, it will be observed, is fitted with a mainsail and a top sail, but these were merely auxiliaries, the principal propelling power being the oars. Many of the early Mediterranean galleys were of great size and the royal galley of the Emperor Caligua, the greatest of them all, required the combined efforts of 1,600 oarsmen to drive it through the water! That, of course, was exceptional, but a 150-foot ship with a crew of 300 slaves at the oars may be regarded as of average size.



The Viking ships illustrated on the Danish issue of 1927, and on the U.S.A. Norse Centennial 5c. issue of 1925, are much later in date than the galleys we have just described, although an early specimen, to be seen on the Esthonian 5m. stamp of the 1919/20 issue, reveals a striking resemblance between the early Viking and Mediterranean ships. An interesting feature of the Viking ships was the placing of the warriors' shields along the bulwarks as a breastwork for the oarsmen, and, incidentally, to save space.



Passing to more modern times, we encounter the wonderful little ships sailed by John Cabot, illustrated on the 10c. value of the Newfoundland 1897 issue, Vasco da Gama, shown on Portuguese commemorative of 1898, and Christopher Columbus, in their great voyages of discovery in the 15th and 16th centuries. The *"Santa Maria,"* the flagship of Christopher Columbus, a vessel of only 233 tons burden and having an overall length of only 128 ft., is probably the best known of all stamp ships, and a catalogue of stamps on which it has appeared would take up quite a considerable amount of space. Our illustration is from the United States series that appeared in January, 1893, and was issued in connection with the Columbian Centennial Exhibition at Chicago.

A very interesting sidelight on these wonderful pioneer ships, in comparison with modern liners, is gained from the reproduction of the *"Santa Maria"* that was prepared in connection with this Exhibition and sailed across the Atlantic on exactly the same track as that followed by Columbus himself on his first voyage! The greatest speed attained during the voyage was only 6½ knots and, throughout, the vessel pitched and rolled in a most alarming manner.

Cabot's ship, in which he discovered Labrador, carried a crew of only 18 men, while Vasco da Gama's *" San Gabriel,"* in which the great Portuguese navigator discovered the sea route to India, was a mere shell of less than 100 tons displacement. The pluck and endurance of these early navigators passes the comprehension of modern ocean voyagers.

It is, perhaps, natural that in their search for inspiration stamp designers should look to old time vessels to provide their most interesting themes. Nevertheless, there are many interesting specimens that bridge the gap between Vasco da Gama's day and modern times. Particular reference should be made to the 12 cent value of the U.S.A. issue of 1869 on which is shown an early steam mail ship fitted with auxiliary sails. Unfortunately, the price of this specimen places it out of the range of the average young collector. Up-to-date passenger liners are quite freely represented and as an example we illustrate the 10 cent value



(*Continued on page 499*)

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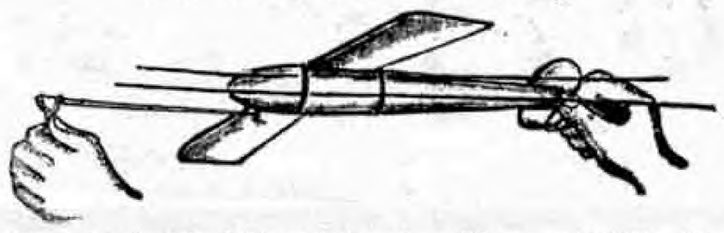
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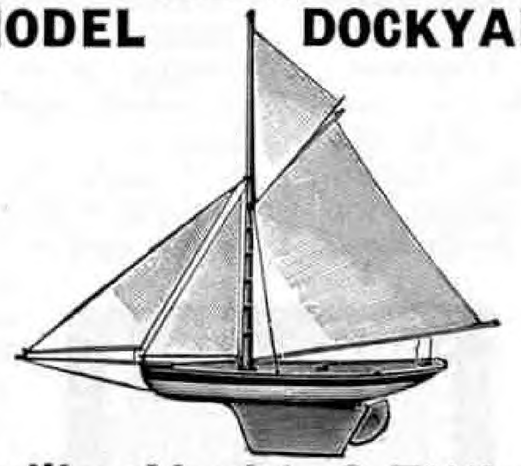
You shoot this 'plane into air with a catapult, the flight record so far attained is 1,000 feet in 65 seconds. Record of Loops 3 at a flying height of 100 feet. Try and beat this. With catapult and full instructions. **Price Complete** **1/-**
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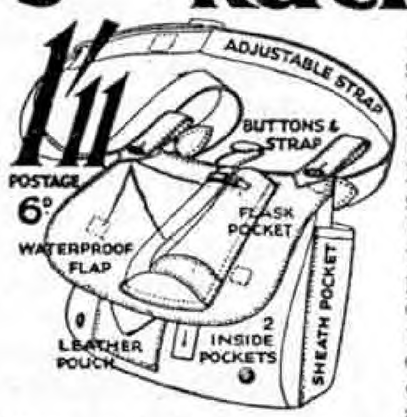


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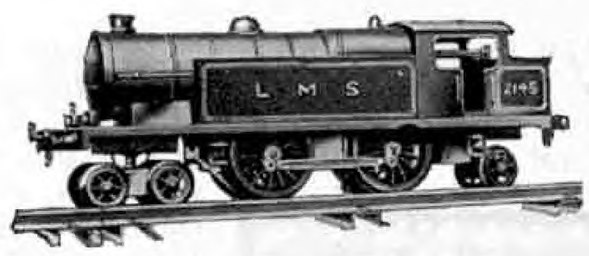
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This is a strong and durable Locomotive, capable of any amount of hard work. It is richly enamelled, highly finished, and is fitted with brake mechanism and reversing gear. Supplied in colours to represent L.M.S.R., L.N.E.R., S.R., or G.W.R. Locomotives. Gauge 0. Price **12/6**

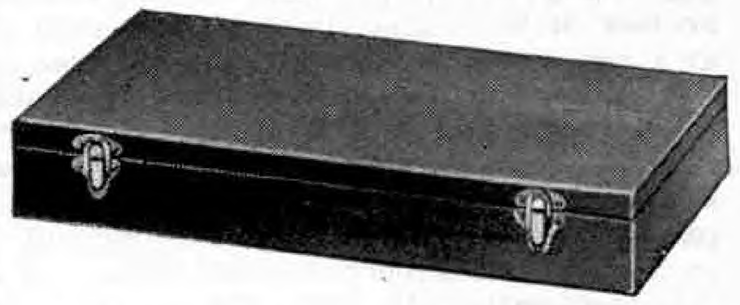


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Special Tank Locomotive

This Locomotive is fitted with a very powerful Clockwork mechanism, giving great length of run and exceptional pulling power. It is a perfect model in every respect and is beautifully finished in the colours of the L.M.S.R., L.N.E.R., G.W.R. and S.R. Gauge 0. Price **25/-**

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Stamp Gossip



Greek Independence Commemorative

In our Stamp Gossip notes in the April issue we gave some preliminary details of the Greek Independence series that had just been issued. This month we are able to give a selection from the designs, and it will be agreed generally that the standard of production—Messrs. Perkins, Bacon & Company, and Messrs. Bradbury Wilkinson & Company, both of London, are responsible for this—is well up to that of the several recent beautiful Greek issues.



The stamps have been produced in two parts, each consisting of nine issues, and each of the firms mentioned has been responsible for one of the sections. Messrs. Perkins, Bacon & Company produced the range of portraits of the type shown in our illustration of the 10 lepta value, the general details of the series being as follows:—10 lepta, brown, Righas Ferreo; 50 lepta, red, Lascarino Bouboulina; 1 drachma, carmine, Th. Colocotroni; 1.50 drachma, light blue, Kariskakes; 2 drachma, orange, Andreas Miaoulis; 5 drachma, violet, Capo d'Istria; 10 drachma, grey, P. Mavromichalis; 15 drachma, green, Solomos; 20 drachma, grey-blue, Corais.



Messrs. Bradbury Wilkinson's series is the more interesting, for, in addition to a number of portraits, it contains several very interesting pictorials, from which we illustrate two specimens. The 4 drachma value illustrated shows a map of Greece with the areas possessed in 1930 and in 1830. The 25 drachma value, not illustrated here, carries a picture of the scene at the declaration of independence, with the priest Germanos in the centre swearing his audience to loyalty to the cause.

The most interesting stamp of all is the 50 drachma value, also shown here, in which is depicted the famous Sortie of the Missolonghi. The inhabitants of the town had been besieged by the Turks for over 12 months and, on the night of 23rd May, 1830, the 30,000 remaining inhabitants poured out of the gates of the town in their attempt to fight their way through the Turkish ranks to safety. Unfortunately, their plans had been disclosed, and the Turkish Army had been posted in strength opposite the points that were to be attacked, with the result that less than 9,000 of the 30,000 came through alive!

The remaining stamps of the Bradbury Wilkinson set are as follows:—20 lepta, black, The Patriarch Gregory V; 40 lepta, blue-green, Demetrius Ypsilanti; 50 lepta, blue, Ath. Diakos; 1 drachma, brown-orange, Constantine Kanaris; 1.50 drachma, scarlet, Marcos Botzaris; 3 drachma, brown-purple, Lazare Kondouriotis.

The perforations for the Perkins, Bacon series were $13\frac{1}{2} \times 14$, and for the Bradbury Wilkinson set 12.

Norway Commemorates Patron Saint



In celebration of the ninth centenary of the death of its patron saint, Norway has issued a set of four stamps representative of various incidents in his life.

The story of St. Olaf's life is exceptionally interesting. Born in 995, his early life was spent in England fighting the Danes. Later he returned to Norway and in 1016 ascended the throne. His policy was to secure a united Norwegian kingdom and a united Norwegian church bound to the Christian faith. The nobles of the country were openly against him and ultimately they sided with the Danish king, Canute, when he claimed the sovereignty of Norway. The murder of one of the leading nobles by an ultra-enthusiastic supporter, compelled Olaf to flee to Russia, but in 1030 he returned to attempt to regain the throne, supported by a scarecrow army of outlaws and mercenaries. The ensuing Battle of Stiklestad, in which Olaf was killed, is shown in a beautifully engraved design on the 30c. value of the new issue.

His death, as *Gibbons' Stamp Monthly* puts it, was his making, for it was not long before the Norwegian nobles discovered that the Danes were no light taskmasters, and that Olaf's policy was certainly the way to prosperity. Miracles were said to have been worked at the tomb of Olaf in the Trondhjem Cathedral, a view of which is shown on the 15 ore value, and ere long Olaf the Fat, of despised memory, became St. Olaf the Holy, the patron saint. On the 10 and 20 ore values of the new set he is shown defying a really extraordinary onslaught of arrows.

New Air Issues

Among the several interesting new air stamps of this month, pride of place must go to Italy's photogravured set, from which we reproduce the two lire value.

There are four designs and five denominations in the series: 50c., 80c., 1L., 2L., and 5L., the designs representing respectively: 50c. and 5L., the winged horse Pegasus; 80c. a symbolic design of eagles' wings; 1L., an angel, while the 2L. value, as can be seen, is symbolic, showing arrows speeding on their way round the world.

Another interesting new issue comes from the Belgian Congo, where two new values, 15 and 30 francs, have been added to the set that has been in use since 1920. The 15f. stamp, illustrated here, shows a biplane flying over a Congo village and is very similar in appearance to the old one franc issue.

Stamp Collecting—(*Continued from page 497*)

of the U.S.A. Pan-American Exhibition issue of 1901, showing a large Atlantic liner. A modern lake steamer is depicted on the one cent denomination of the same issue.

Probably the most interesting, and certainly the most recent illustration of an Atlantic liner, appears on the Belgian Anti-Tuberculosis issue of last year, the 1f. 75c. value of which gives a striking view of Antwerp Harbour with a great four-funnelled ocean greyhound in the foreground.



Cargo steamers are available, too, and an interesting example is to be found on the current Nauru issue illustrated here, showing a typical "freighter" steaming past a tropical shore.

No pageant of shipping would be complete without a reference to warships, and by far the best illustration available is on the 3 drachma value of the current Greek issue, illustrated here, showing the cruiser "*Giorgios Averoff*," a vessel 462 ft. in length and carrying a crew of 560. During the Balkan wars of 1911-14 it served as the flagship of the Greek Navy.

Important Announcement

The manufacturer of Sutcliffe Model Boats wishes to announce that the new

SUTCLIFFE
Two-Speed Electric
SPEED BOAT

a sample of which attracted so much attention at the British Industries Fair, can now be obtained at most good class toy shops.

This model is made to the very latest and most brilliant design of a real speed boat (not a flat bottom) and is fitted with a very efficient motor and switch board arrangement.

Price, with Painted Spray Hood,

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Every Meccano dealer who has not yet seen this model should immediately get into touch with the manufacturer and sole distributor:

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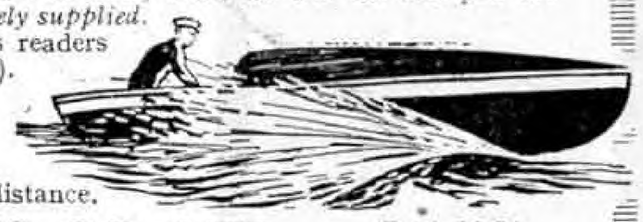
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Loud Toc-Toc heard for great distance.

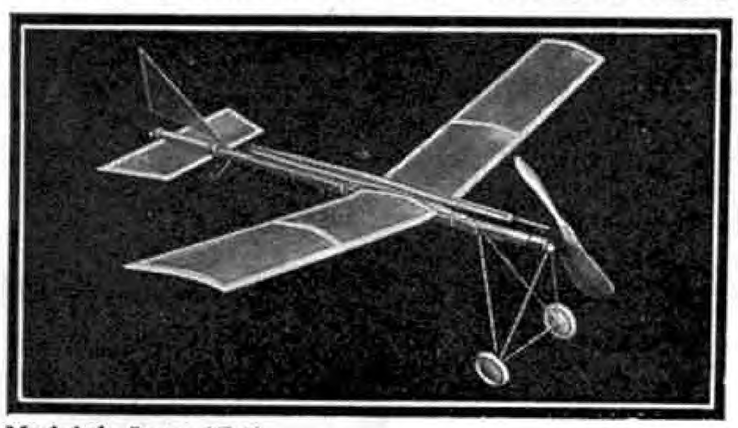
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The 1930 "SKISAIL" Tractor Monoplane

CONSTRUCTIONAL SET

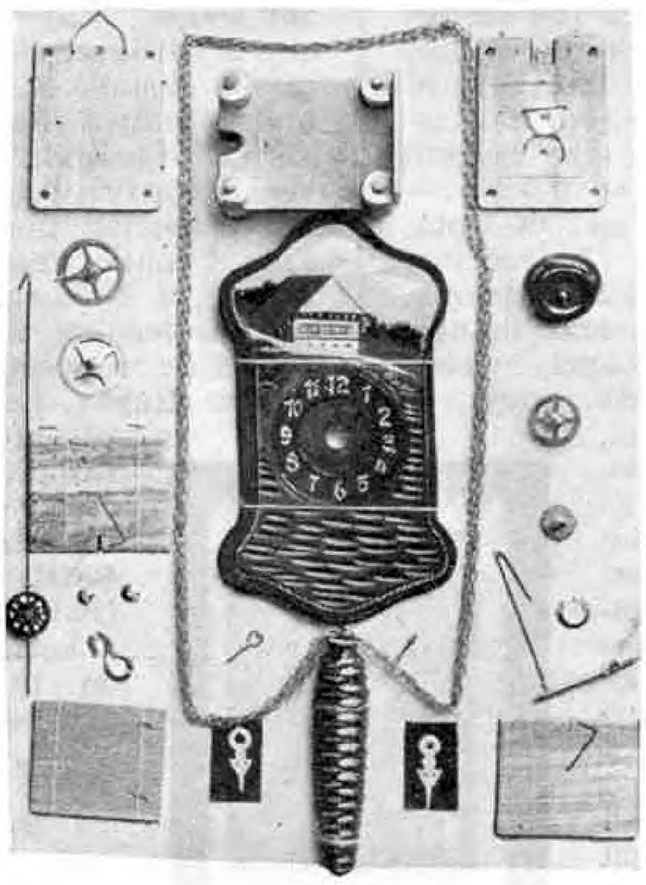
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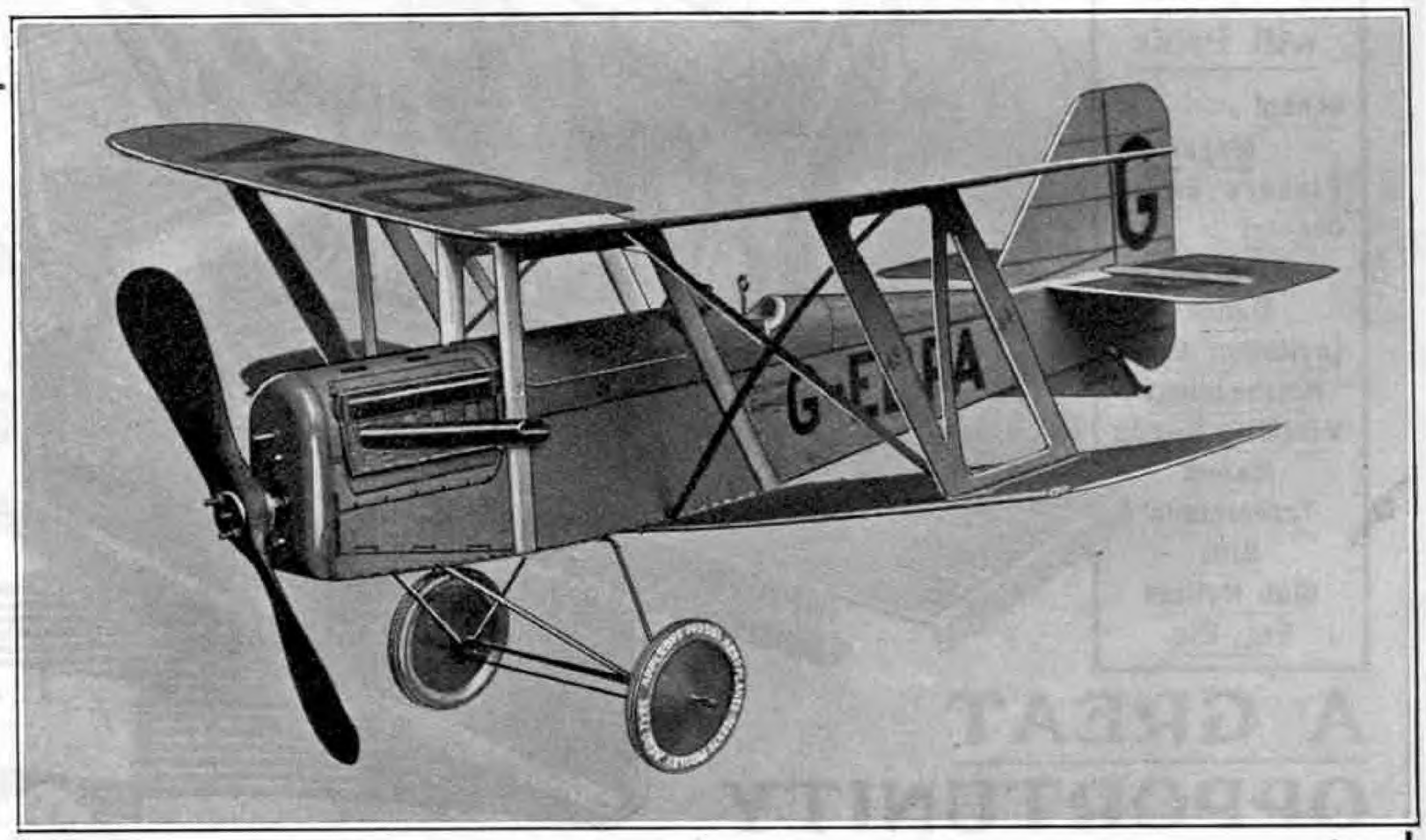
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The S.E. 5A Single Seater Model Biplane.

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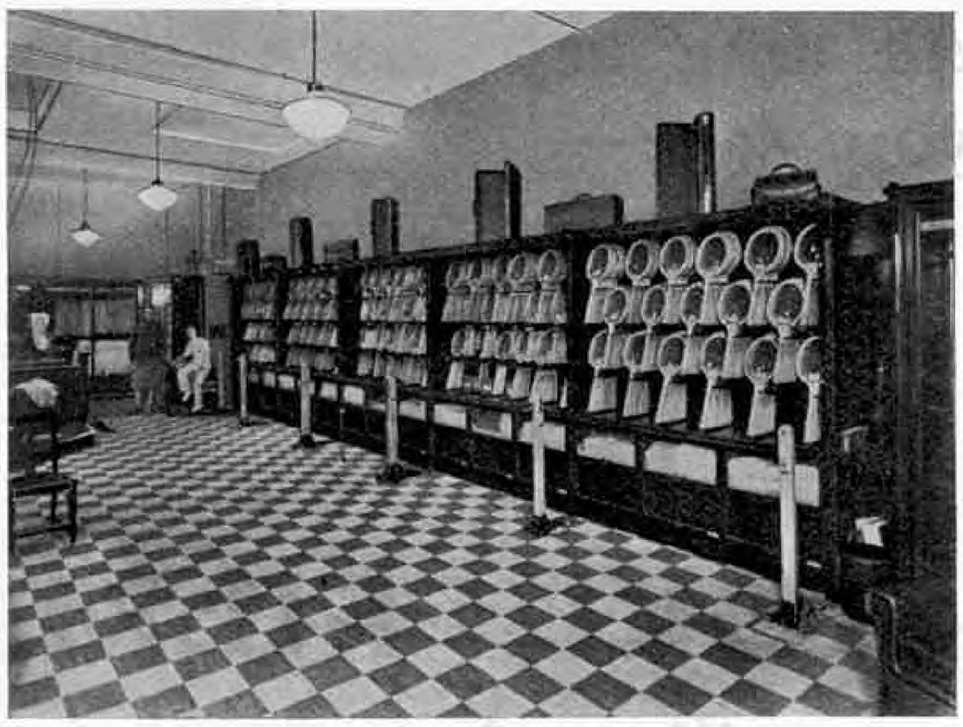
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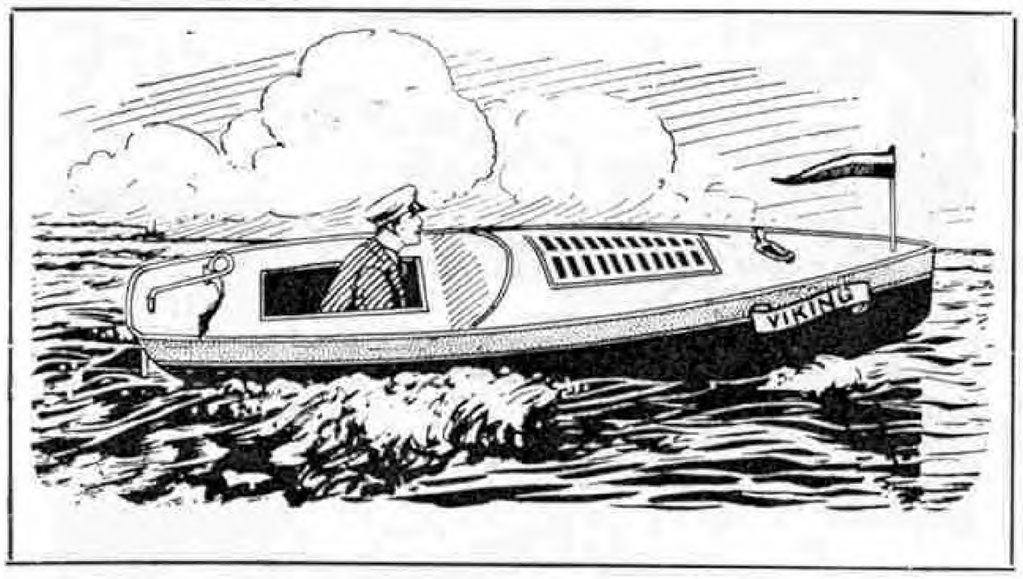
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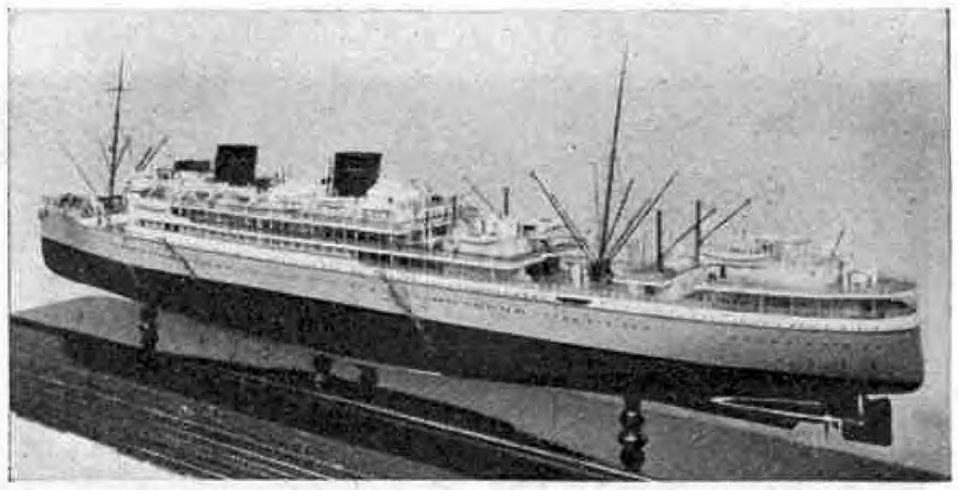
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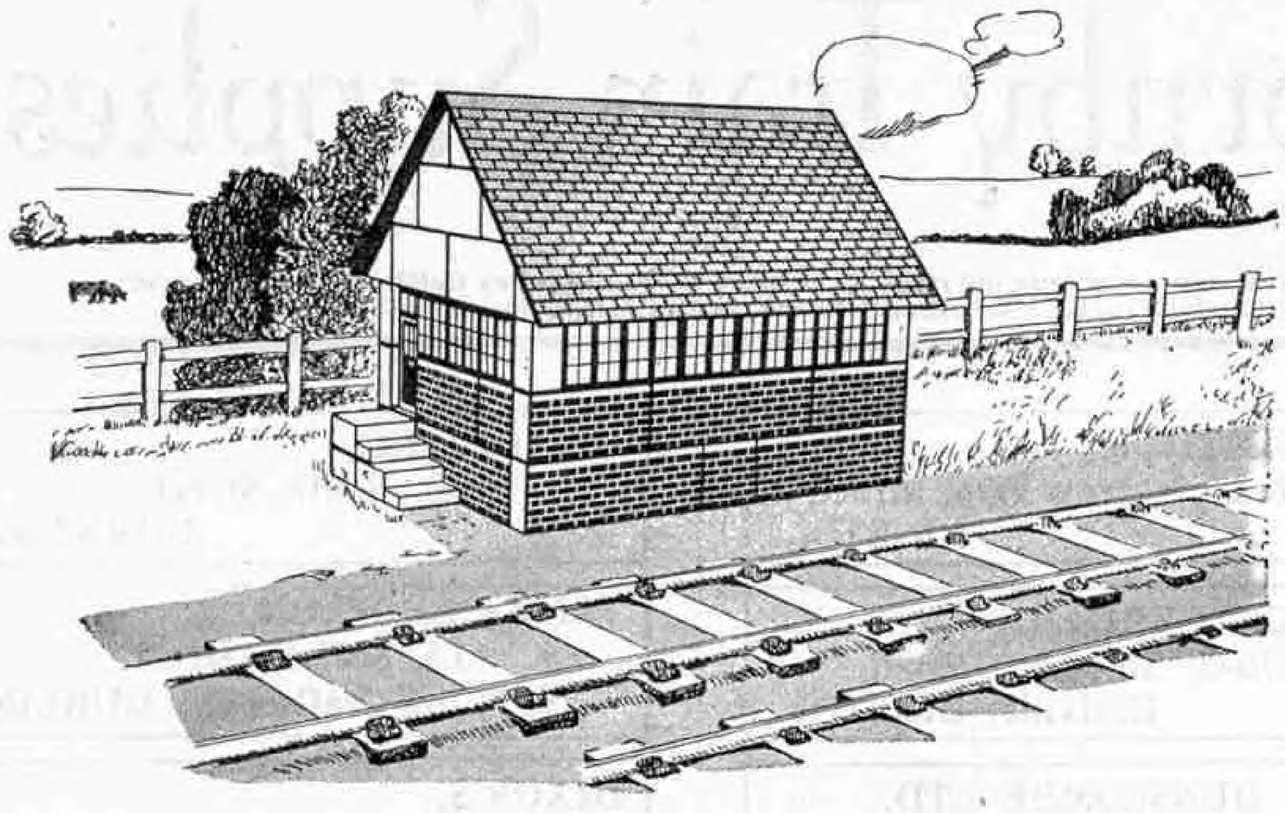
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with neat dice effect on Collars, Cuffs, and at base of Jersey.

Obtainable only from Jaeger Branches and Agents.
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Build Models from your own drawings

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The "*M.M.*" may be ordered from all Meccano dealers, or from any newsagent or bookstall, price 6d. per copy. If desired it will be sent direct, post free, for 4/- for six, or 8/- for twelve issues. As a rule back numbers cannot be supplied, because only sufficient copies are printed to fill standing orders. To prevent disappointment, therefore, place a regular order with your dealer, newsagent or the publishers—

"Meccano Magazine," Binns Road, Old Swan, Liverpool.

COMPLETE YOUR FILES



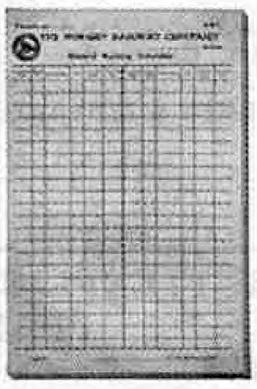
All "Meccano Magazines" prior to December, 1923, are out of print. Each of the 1924 issues, with the exception of January, February and September is in stock. Only the June, July, October and November, 1925, issues are available. All the 1926, 1927, 1928, 1929 and 1930 issues are in stock, with the exception of January, February, April and May, 1926, and March, July, August and September, 1927, January and February, 1928.

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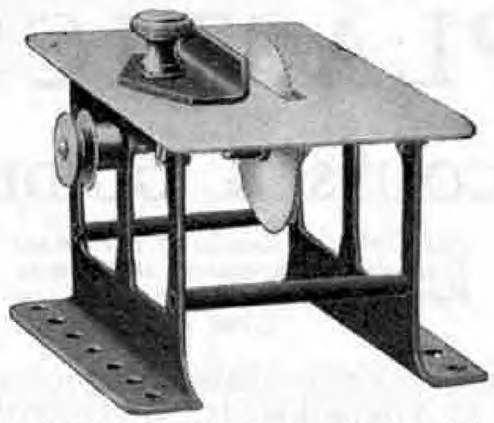
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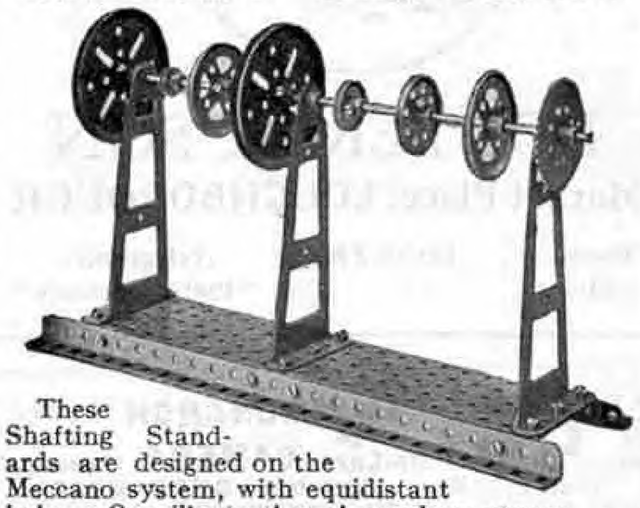


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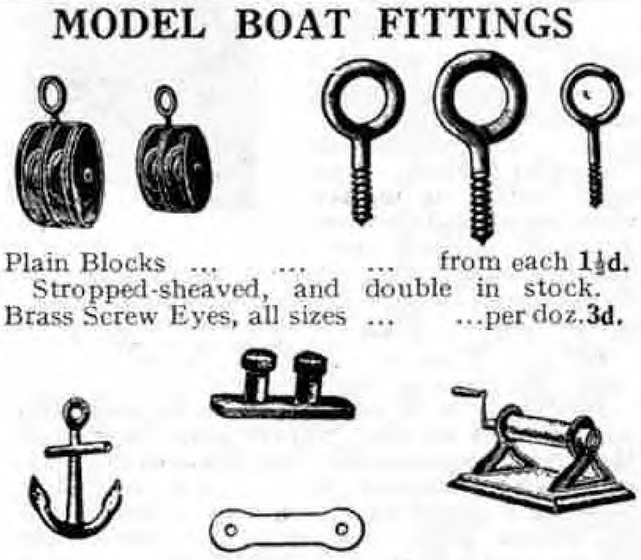
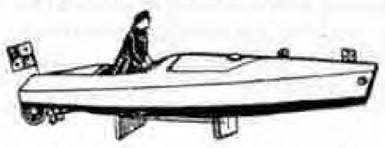
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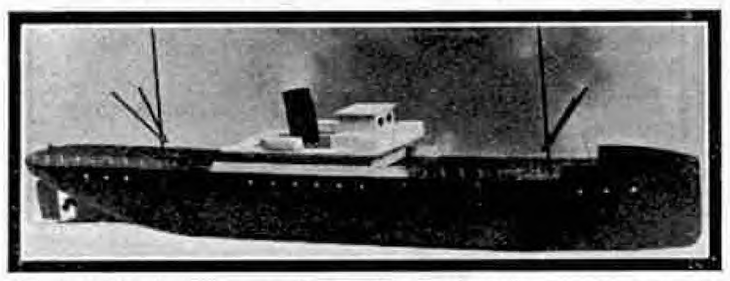
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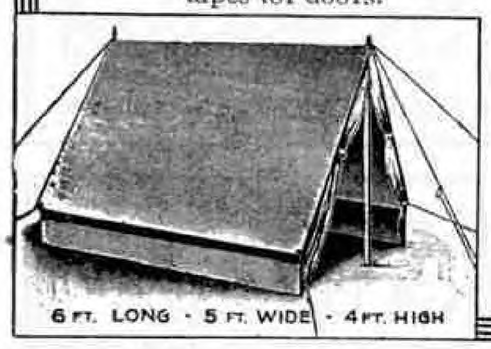
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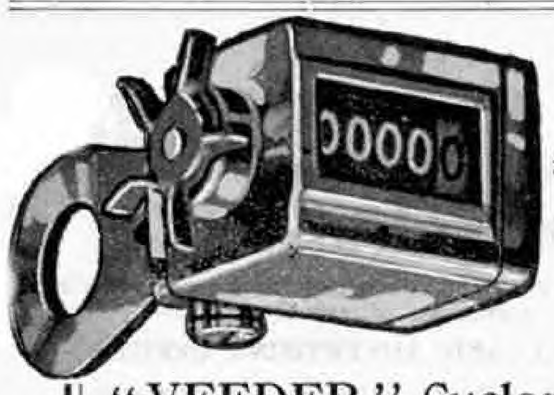
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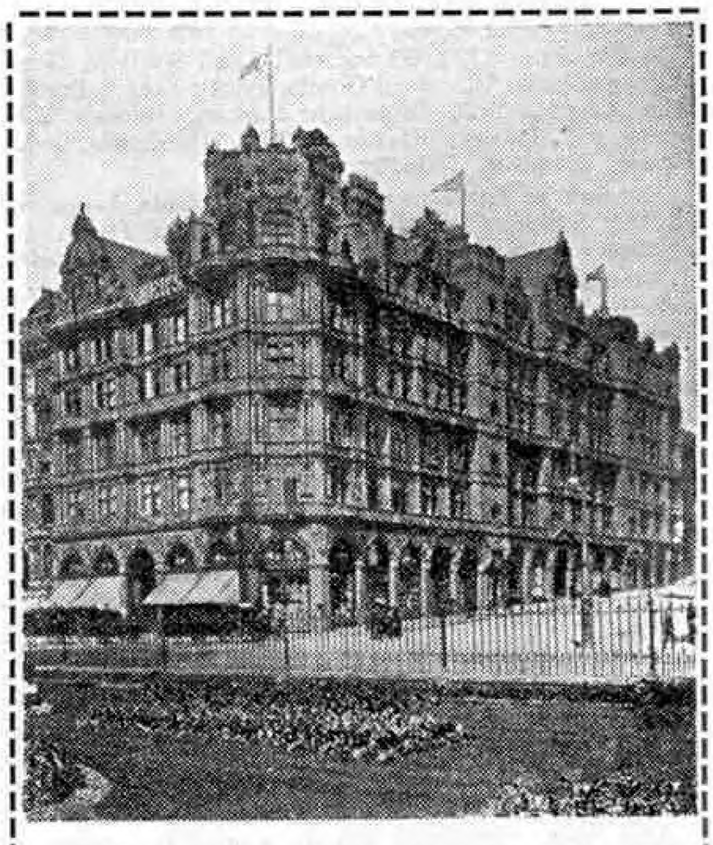
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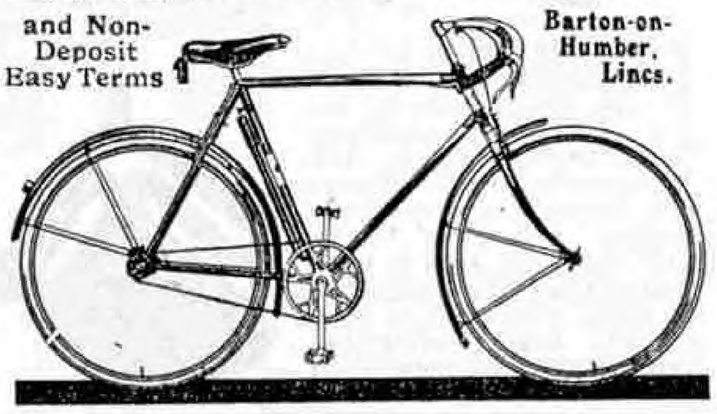
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Publication Date. The "*M.M.*" is published on the 1st of each month and may be ordered from any Meccano dealer, or from any bookstall or newsagent, price 6d. per copy. It will be mailed direct from this office, 4/– for six issues and 8/– for twelve issues.

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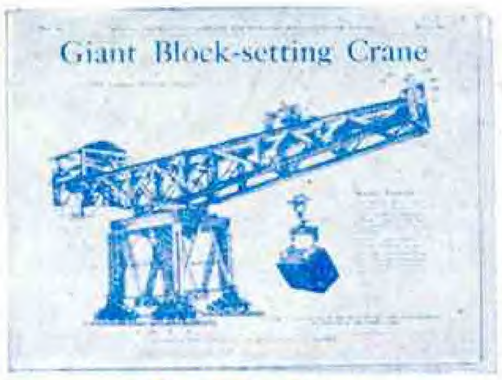


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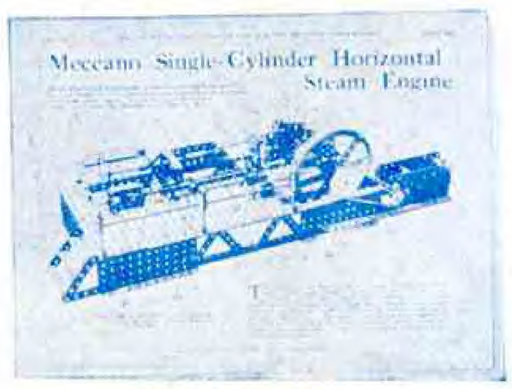
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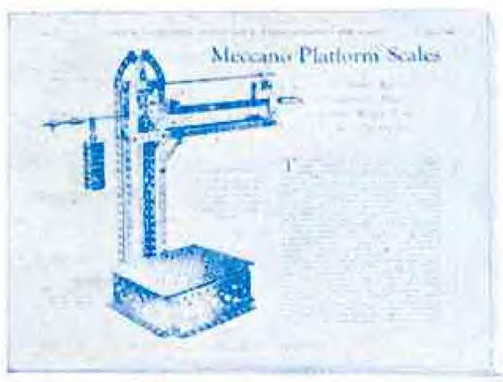
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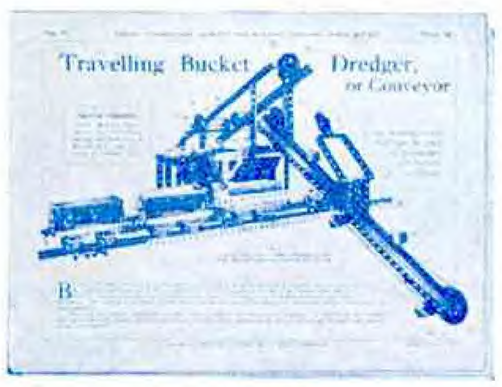
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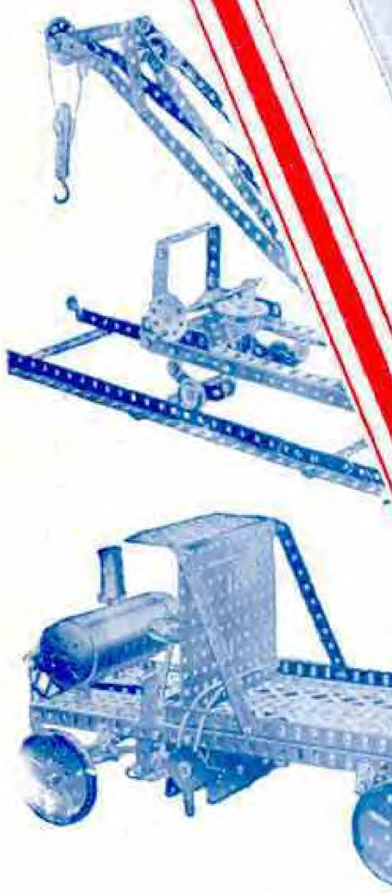
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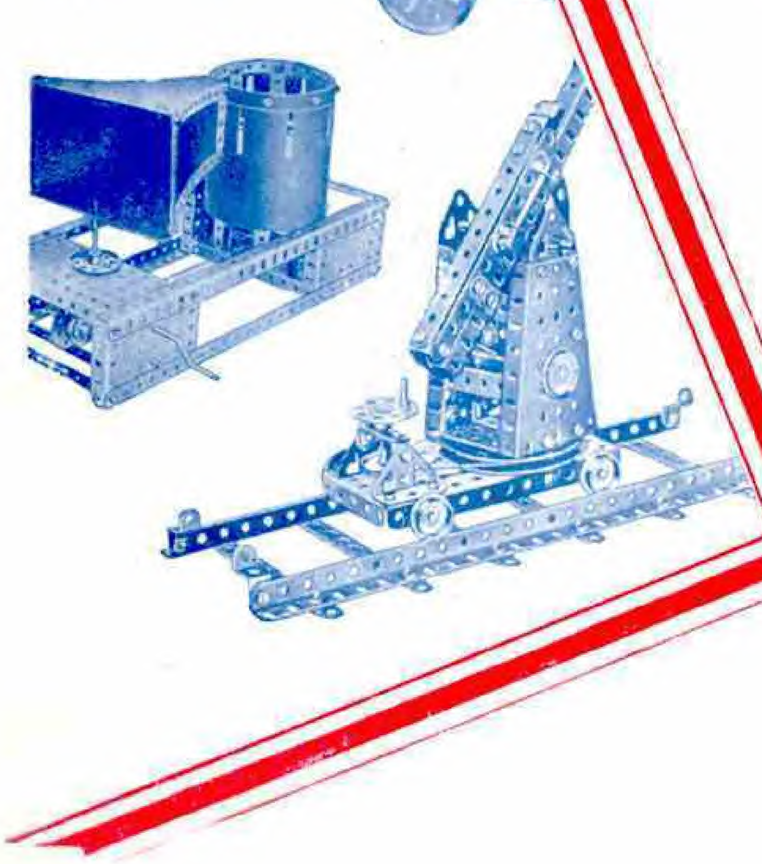
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